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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. 09 Issue 01 /January 2021 (Quarterly)

HIGH LIGHTS

- FutureSkills PRIME
- Skill Development of SC / ST/ EWS (Women) youths in Aspirational Districts
- Special feature on NIELIT Delhi
- Empowerment of Senior Citizens in e-Services
- Tech-वार्ता

Message from the **Editor-in-Chief**

Dear Readers,

Welcome to this issue of NIELIT Newsletter. It covers noteworthy accomplishments of NIELIT during the last quarter of pandemic year. Readers will find some exclusive reports about Empowerment of senior citizens in e-services, Skilling of Government Officials in emerging technologies under FutureSkill PRIME, Collaboration with MSME, Robotics Training for kids etc.

To meet the increasing demand of automationin most of the services, under 'Future Skills PRIME' of MeitY, many NIELIT centres started the re-skilling in 10 areas- RPA, IoT, VR, Big Data Analytics, Cyber Security, Social & Mobile, 3D Printing, AI, Blockchain Technology and Cloud Computing. Many centres adopted 'Blended or Flipped' ways of training.

Likewise, there is more demand for the **'SoftwareTester or Quality Assurance (QA)'** related to safety and security measures. Some of the 'Top Testing Trends of 2021-22' are :

1] **Cloud migration testing:** It ensures no loss of data after migration.

2] **Blockchain testing:** It ensures the chain of blocks, linked together using cryptography and security. We see demands for Miners, testers- Ethereum & ETL, Blockchain debugging etc.

3] **Codeless Automated/AI/ML Testing:** AI technologies adopt visual modelling. It has frontend illustration to support machine meaningful code, while the backend is supported by NLP. Smart analytics and visualization are uses to detect the faults in AI or ML-based systems.

4] **Big Data& IoT Testing:** ETL tester and miners are required in handling large data, different data formats-unstructured or structured. IoT apps need Testers to guarantee integrity, accuracy,reliability, and quality of data necessary and make Smart Devices.

5] **Chatbot Testing:** During the epidemic in need, chatbots benefited the healthcare, retail stores, financial firms as robotic process automation. Careful testing is required for expected scenarios, possible scenarios and nearly impossible scenarios for 24x7.

6] **Agile and DevOps testing:** Agile testing follows incremental steps and gives instant responses. DevOps helps to cut down the SDLC. The adoption of both Agile and DevOps helps the teams for "Quality of Speed".

7] **Cyber security:** All the systems require skilled security experts.

The similar new job opening is available in various Job search sites such as Monster, Naukri, and Guru99.com etc. Many firms are aiming to become Testing Centers for Quality. It is suggested to learn the contents of High-level document, Test plan, Test cases, Test script, Requirement matrix etc. which are syllabus of a course 'Software Tester or Quality Assurance (QA)'.

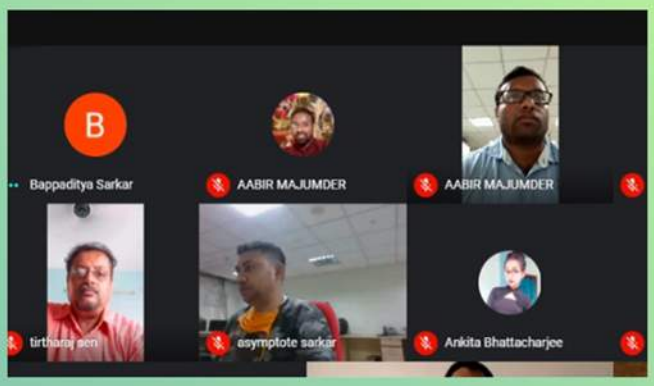
Hope the readers would enjoy reading the news updates and articles. I take this opportunity to request for their valuable feedback at newsletter@nielit.gov.in. Wishing all readers a bright and joyous 2021 !

(Dr. Yumnam Jayanta Singh)
Director/Scientist 'F', NIELIT Guwahati

What is **Inside**

Academic News from Headquarters

The year 2020 has witnessed unprecedented challenges combating with Covid 19 pandemic. NIELIT has successfully managed and rendered exemplary results in processing official work during the lockdown period by leveraging e-office of NIC and open source video conferencing facilities for holding official discussion. NIELIT Centres and Training partners have handled this disruption in the academic sector by deploying different modes of learning through a mix of technologies and adopting work from home culture.



MoU with ni-msme (National Institute Of Micro, Small And Medium Enterprises)

An Agreement was signed between NIELIT and ni-msme to conduct joint training programme across the country in the field of Electronics, Information Technology and Entrepreneurship Development. The agreement was signed by Dr. Jaideep Kumar Mishra, DG NIELIT and Ms. S. Glory Swarupa, DG, ni-msme.

Initially, NIELIT Centres at Patna, Chandigarh, Aizawl, Ajmer and Itanagar would launch training programmes under the joint certification programme with ni-msme. The training will be in blended mode. As the technical education is expected to produce the human capital necessary for the technological growth and the entrepreneurial education helps in self-empowerment, job creation and overall economic development, this agreement would prove to be a major step towards job creation in the country.

Training statistics of 2020

Training Summary (April to December 2020)

Course Category	Number of Candidates Trained/ Skilled/Appeared
Formal Courses *(M.Tech/BCA/MCA/3 Years Diploma etc.)*	1,431
Non-Formal Courses *(O/A) Level in IT/Hardware/Multimedia etc. of 1 year duration or more)*	4,957
Short Term Courses *(excludes Digital Literacy Courses)*	14,903
Digital Literacy Courses *(Appeared in exam)*	3,47,530
Total No. of Candidates	**3,68,821**

Registration Statistics

Registration in O/A/B/C Level (IT), ACC Course and other NSQF Aligned Courses: **58,753**

Empowering Training Partners

- No. of Training institutes authorised to conduct NIELIT O/A/B/C level of courses is **891.**
- Processed Accreditation of **240** Institutes during the pandemic year.
- No. of Facilitation Centres authorised to conduct Digital Literacy Courses is **7,144.**
- Processed Registration of **291** Facilitation Centres during the pandemic year.

NIELIT Services are now in UMANG

UMANG (Unified Mobile Application for New-age Governance) is developed by Ministry of Electronics and Information Technology (MeitY) and National e-Governance Division (NeGD) to drive Mobile Governance in India.UMANG provides a single platform for all Indian Citizens to access pan India e-Gov services ranging from Central to Local Government bodies and other citizen centric services.

NIELIT is in the process of on boarding its around 17 no. of services related to registration, examination and certification (complete life cycle of student) on UMANG App. During the year 2020, following services have been made live on UMNAG Platform which can be accessed under DBT Scheme Tab of UMNAG APP:

Skill Development of SC / ST/ EWS (Women) Youths in Aspirational Districts

Transformation of Aspirational Districts is a major initiative by the Government of India for rapid and effective transformation of districts. NIELIT has been awarded a project to train 21,600 SC/ST/EWS(Women) youths belonging to 60 Aspirational districtsacross 18 states over a period of 3 years. The training will be delivered in the area of IT & Electronics; in one of the 4 courses (NSQF aligned), namely **(i)** Certification Course in Data Entry and Office Automation (135 hours); **(ii)** Advance Diploma in Computer Application Accounting and Publishing (200 hours); **(iii)** Diploma in Installation & Repair of Consumer Electronics Products (350 hours); **(iv)** Solar-LED Lighting Product Design and Manufacturing (350 hours. Training has been already started by NIELIT Centers Imphal, Haridwarand Shimla in blended mode at Chandel, Haridwar and Chamba District respectively involving 239 participants

FutureSkills PRIME

FutureSkills PRIME (Programme for Reskilling / Upskilling of IT Manpower for Employability) programme is jointly conceived by Ministry of Electronics and Information Technology and NASSCOM.T he programme is aimed to cater to the re-skilling/ up-skilling needs of individuals through a B2C offering. The platform would provide interested candidates with multiple options for their skilling needs. NIELIT/C-DAC have been identified as Lead and Co-Lead Technology Resource Centres (RCs) to institutionalize Blended Learning mechanisms in a hub-n-spoke mode, in 10 identified core areas namely 3D printing/Additive Manufacturing, Blockchain Technology, Cyber Security, Internet of Things, Artificial Intelligence, Robotics Process Automation (RPA), Social and Mobile, Big Data Analytics, Cloud Computing, Virtual Reality. Fourteen (14) NIELIT Centresnamely, NIELIT Calicut, Aurangabad, Kolkata, Chennai, Patna, Kohima, Srinagar/Jammu, Delhi, Agartala, Gorakhpur, Chandigarh, Imphal, Guwahati, and Gangtok are involved in the Project. Out of 10 Lead and 30 Co-Lead RCs, NIELIT Centres are in 3 Lead and 25 Co-Lead Resource Centres (RCs). NIELIT Centres at Calicut, Aurangabad, and Kolkata are Lead RCs in 3D Manufacturing/Additive Technology, Robotics Process Automation and Blockchain Technology respectively.

NIELIT endeavours to impart quality training in the identified core areas to meet the objective of FutureSkills PRIME. NIELIT Delhi, J&K, Patna, Kolkata, Guwahati and Calicut have already initiated activities towards its objective.

- NIELIT Patna haslaunched, “Internship program on Internet of Things(IoT)” of 1 month duration in Oct-Nov, 2020 and “Internship program on Future Skills in IT ”in online mode.

- NIELIT Kolkata conducted a Trainers of Training program from 25/08/2020 to 22/09/2020. A total of 17 participants from NIELIT Srinagar/Jammu Centre, NIELIT Patna and CDAC Hyderabad were trained. Also Organized a one day webinar on 29th October 2020 on Blockchain. Also conducted the Govt Officers Training (GoT) from 17th December 2020 to 6th January 2021. A total of 9 participants from Maulana Abdul Kalam University (formerly WBUT), RCCIIT West Bengal and Urban Development and Municipal Affairs Department, Kalyani District, WB attended the training.

- NIELIT Guwahati has conducted training program on “Cloud Computing for Govt. Employees (under FutureSkills Prime Project)” The program was inugrated by Dr. Y. Jayanta Singh, Director, NIELIT Assam & Meghalaya on 15th of December, 2020. He had given a detail presentation on FutureSkills program of Govt. of India, in his inaugural speech. Ms. Indrani Laskar, ACS, Joint Secretary, Dept. of IT, Govt. of Assam and high level officilas from various departments of Govt. of Assam & Govt. of India has attended the training program. The training covers Cloud Technologies for users and providers prospective, with handson and Cloud security.

- NIELIT, Calicut, Lead Resource Centre for 3D Printing and Additive Manufacturing has conducted Training of Trainers program through online mode. The training was conducted by Wipro 3D with experts from industry and academia. The duration of the training was 10 days and the training was conducted for identified faculties of Lead/Co-Lead/Hub/Spokes towards the goal of providing uniform training and technical exposure to all Trainers who are part of this initiative.

News From Imphal Centre

Inauguration of PGDCA Course in Blended Mode

Dr. Rajkumar Ranjan Singh, Hon'ble Member of Parliament, Lok Sabha inaugurated blended mode of training of One year "Postgraduate Diploma in Computer Application (PGDCA)" course at NIELIT Imphal in the virtual mode in the august presence of Dr. Jaideep Kumar Mishra, DG NIELIT &Joint Secretary, MeitY, Govt. of India and Th. Prameshwor Singh, Executive Director, NIELIT Imphal.

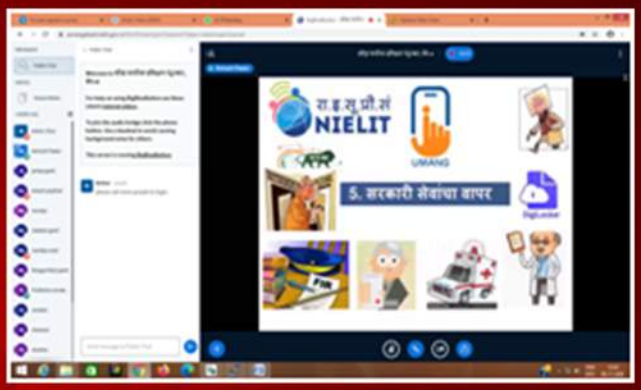
In the present academic session, 70 students were enrolled in the course. The faculty members and students also attended the inauguration program through online. Dr. Rajkumar Ranjan Singh, Hon'ble Member of Parliament, Lok Sabha appreciated such initiative of NIELIT Imphal which will be beneficial to the student community during the pandemic time.

Free Book Distribution to SC/ST Job Seekers

Free book distribution function for 13th batch of SC/ST job seekers training in IT O-Level and 9th batch of SC/ST job seekers training in Computer Hardware Maintenance (CHM) O-Level sponsored by National Career Service Centre Imphal under Directorate General of Employment was held on 23rd December 2020 at NIELIT Imphal. The function was graced by Th. Prameshwor Singh, Executive Director, NIELIT Imphal and Sandeep Kumar, Sub Regional Employment Officer, National Career Service Centre Imphal (NCSC). Altogether, there are 100 nos. of SC/ST job seekers who are undergoing training in IT O-level (57 at Imphal, 17 at Senapati & 26 at Churachandpur) and 50 SC/ST job seekers are undergoing training in CHM-O Level.

News From Aurangabad Centre

Empowerment of Senior Citizens in e-Services

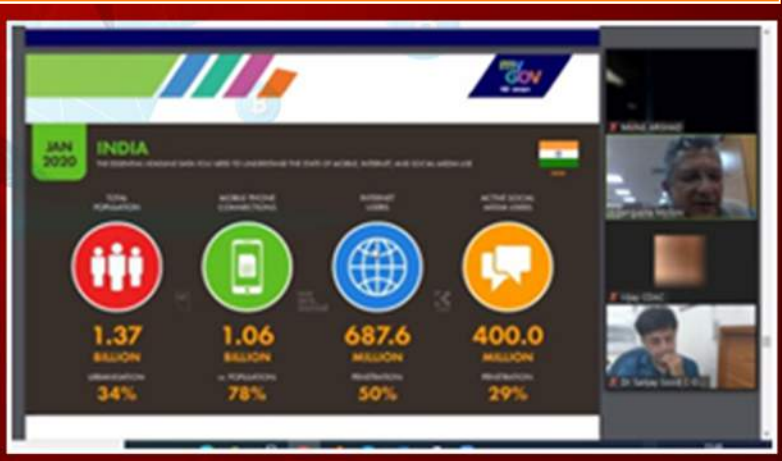


Training of senior citizens for Nandurbar district of Maharashtra is being conducted by NIELIT Aurangabad under "Awareness Campaigns/Events for Empowerment of Senior citizens in e-services through ICT tools" a project sponsored by MeitY, Govt. of India. Duration of the program is 40 hours, in which training on various topics like operating mobile phone, social media apps, Online transaction, precautions to be taken during online transactions, ticket booking, UMANG app and govt. schemes, etc. are provided. In the initial phase, training of 2300 senior citizens was conducted for Nandurbar district in online mode. The response received from the elderly people is overwhelming.

ICT Training was given to senior citizens among the villagers of Patoda village in Aurangabad District in December 2020. NIELIT Aurangabad officials visited the village and imparted ICT Training to them demonstrating and explaining the various online services available to them.

Online training on SMAC for Government Officials

NIELIT Aurangabad organized free online training for Government Officials on SMAC (Social Mobile Analytics and the Cloud) sponsored by MeitY, Govt. of India for ten days from 21st December onwards. There were ten participants for the program. Shri. Lakshman K, Scientist/Engineer'D' was the resource person for the program and is also the Chief Investigator for SMAC



Webinars on Blockchain

Blockchain has emerged to become a potentially transformative force in multiple aspects of government and private sector operations. A series of live webinars on block chain was organized by NIELIT Aurangabad during

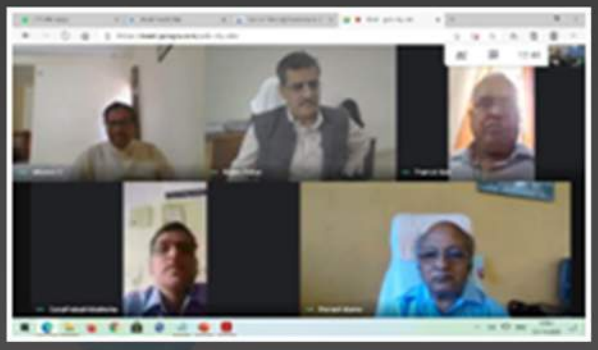
Dr. Sanjeev Gupta, , Executive Director, NIELIT Aurangabad was the resource person for the webinars. Staff members of various NIELIT Centres attended the webinars.

NIELIT CII Centre of Excellence for Skills (NICCS)

NIELIT CII Centre of Excellence for Skills (NICCS) project is being implemented by NIELIT Aurangabad with the objectives to use cutting edge technology to improve learning outcomes and satisfy industry needs and enhance the employability of the youth of the country. The CoE will host technologies like Augmented Reality (AR), Virtual Reality(VR), 3D models, RFID, Interactive video wall and Learning Platforms to deliver vocational training courses in industrial technology. Under this project CovidSathi Course concluded in November 2020. 78 candidates have completed the course. Advertisement for health care assistant course has been published and 40 candidates have registered for the course.

Executive Committee Meeting

25th Meeting of the Executive Committee (EC) of NIELIT, Aurangabad was held under the Chairmanship of Dr. Sanjeev Kumar Gupta, Executive Director, NIELIT, Aurangabad on 13th November 2020 at 11:00 Hrs. at NIELIT, Aurangabad through Video Conference.



Webinar

Dr. Sanjeev Kumar Gupta was the invited speaker at a webinar conducted by Little Flower High School, Aurangabad on Career in Electronics & Information Technology on 01-11-2020

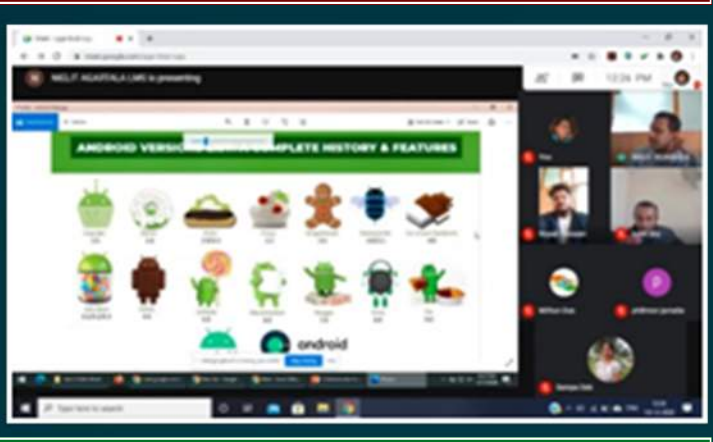
News From Agartala Centre

Capacity Building for Tripura Police - Economic Crimes

NIELIT Agartala has conducted a 10 Days customized course on Economic Crimes for the Tripura Police. An inauguration session of the Coursewas held at Tripura Police Training Academy on 08.12.2020 in presence of Shri Anurag Mathur, Director Incharge, NIELIT Agartala and Shri Dilip Ray,Principal,KTDS Police Training Academy.

Training for Directorate of IT, Tripura - Android

NIELIT Agartala conducted 14 days Training on Android App development for Directorate of Information Technology, Govt of Tripura officials in Blended mode (20 Hrs: Online & 30 Hrs Offline in Lab) starting from 14.12.2020.Shri Binoy Das,Sr.Technical Officer and Md.Reyad Hossain,Faculty(Computer Science) are the resource persons from NIELIT Agartala.

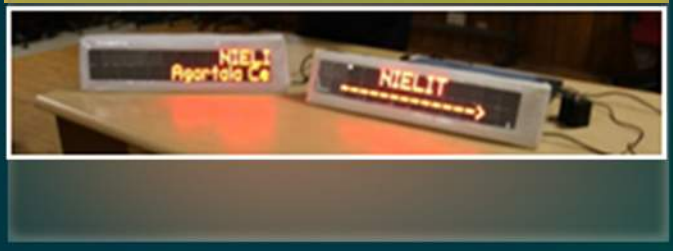


Border Area Development Programme

Border Area Development Programme (BADP) Skill development training of Khowai, Padmabil and Tulasikhar R D block sponsored by Office of the District Magistrate and Collector, Khowai,Govt of Tripura commenced on 18.11.2020 at NIELIT Agartala.

NIELIT Agartala conducted STAR (Scheduled Test for Airmen Recruitment) Exam of Indian Air Force on 4th November 2020. Nearly 100 candidates appeared for the Exam.

Digital Moving Display



A Digital Moving Display controlled by Android App has been developed by Shri Akula Sri Rama Pavan,Sr. Technical Assistant, NIELIT Agartala.

NIELIT CENTRE DELHI

NIELIT Delhi Centre was established as Branch Office of NIELIT Chandigarh Centre in the year 2000. It became an independent Centre on 1st November 2012. The Centre is operating in a rented accommodation of about 11500 sqft area in Parsvnath Metro Mall at Inderlok, Delhi. The Centre is imparting training programmes aimed at skill upgradation and capacity building in emerging areas of IECT and is also involved in implementation ofvarious schemes/initiatives of Govt. of India such as National Digital Literacy Programmes, IT for Masses for SC/ST Job Seekers, ESDM etc. It has proven its capability of providing quality Computer Education and handling large projects of Govt. Organizations in different sectors.The Centre is fully geared to meet the new challenges in IT and to become a front-runner in new technologies.

Areas of Excellence

- Cloud Computing, Artificial Intelligence, Social & Mobile
- Software development and Technical support services
- Conduct of recruitment examinations in both online and offline mode

Long Term Courses

NIELIT O/A Level courses, CHM - O Level course, MAT-O Level course, PG Diploma in IOT, PG Diploma in VLSI Design, tools and technology, Certificate course in Arduino based Embedded System Design

Courses Offered

Short Term Courses

IT&ITeSCourses - Web Designing, Programming Through C/C++/Python, C and C++, CCNA, Routing and Switching for CCENT Certification, Computer System and Server Administration, Web Application Technologies, ASP.Net with VB/C#, Certified Android Apps Developer, System Administration using (Linux, Data Entry and office automation, Financial Accounting using Tally, Refresher course in IWD/C, Cloud Computing, Big Data and Hadoop, Cyber Security Basic Literacy Course, CCC, Photoshop, course in 2D animation, Certified Audio Video Designer, 3D Animation

Electronics&Hardware Courses – Embedded System Design using 8051 and AVR and Arduino, Embedded System Design using ARM/CORTEX Microcontroller, Internet of Things using Arduino/Raspberry Pi, Certificate Course in VLSI Design, PC Assembly & Maintenance.

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Highlights & Achievements

- Trained about 700 (yearly) students in various short-term courses through Online mode and the students were awarded e-Certificates.

- Organized a three days training program on 'Big Data Analytics' for 20 officers of BSF. The training was also attended by IG Provisioning and DIG (IT).

- Conducted a 10 days training program on 'CCNA Routing' for about 20 officials of BSF. Through this training, the participants have also been prepared to acquire CISCO CCNA Certification. A three-week training program on "ASP.Net with C# and SQL Server" was also conducted for the IT Cell officers of BSF.

- Conducted 3 days training programs on 'Cyber Security-Risk Mitigation' for two batches of National Security Guards (NSG) officers. The training was attended by about 30 officers in two batches. The training covered the basic principles of cyber security from the perspective of providing security awareness and its best practices for the real world, latest Internet security techniques, firewalls etc. The training also covered various aspects of Cyber Threats, Cyber-attacks, awareness about various ways to mitigate the risks.

- The Centre conducted a 2 weeks training program on "Computer Networking and Server Administration" for Broadcast Engineers of Delhi Doordarshanat National Academy of Broadcasting and Multimedia (NABM), Ministry of Information & Broadcasting, Govt. of India. A total of 25 Broadcast Engineers attended the

- Conducted a 5 months course on Certified Multimedia Developer (NSQF Level-5) to the7th batch of Defence Personnels sponsored by Directorate General of Resettlement (DGR). About 40 defence personnel of JCOs/OR ranks participated in this program. All successful participants were distributed certificates during the valedictory ceremony.

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Recruitment

Conducted Online examinations for Flight Crew(FC) and Aircraft Maintenance Engineers(AMEs) on behalf of DGCA for about 27000 candidates. The Online examinations were conducted in 15 cities across India at 20 examination centres.

Successfully completed the process of recruitment to the posts of Scientist 'C' and Scientist 'D' for Indian Computer Emergency Response Team (ICERT), MeitY for 56 posts. Applications were received through the Online portal for both the posts. OMR based screening examination was conducted by the Centre across 10 cities in India. In the second stage of recruitment process, documents related to qualification, experience, research publications and conferences attended were received online from the candidates who cleared the Screening test.

Training For Lok Sabha Secretariat, Parliament Of India

NIELIT Delhi Centre organized a 5 Day Training program on Desktop Publishing tools for the officers of Parliamentary Research and Training Institute for Democracies (PRIDE) of Lok Sabha Secretariat from 7th Dec 2020 – 11th Dec 2020. A total of 31 officers/officials of Parliament were trained.

News From Patna Centre

National SC-ST Hub

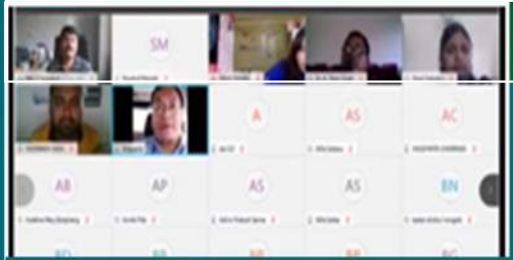
NIELIT Patna is Conducting various IT and Electronics Courses for Schedule caste and schedule Tribe candidates under the project "National SC-ST Hub approved by the Ministry of MSME". This is a free of cost Skill Enhancement program for the Schedule caste and Schedule Tribe candidates. After completion of this course candidates may use their skill to start a start-up or become an entrepreneur. For the start-up,the scheme provides loans and other benefits to the candidates.

News From Guwahati Centre

Jorhat Extension Centre

Training on IOT using Arduino

The two week training program on IOT using Arduino was conducted from 15th -29th Dec 2020. The batch comprises of 7 students from H.R.H Prince of Wales Polytechnic Institute. Earlier four batches have completed the training.



Training Program on Moodle

The One week training program on Moodle in online mode was conducted from 6th -12th October 2020. A total of 75 candidates (students and teachers) from colleges and universities from different parts of the country participated in the training program. The program was conducted by NIELIT Jorhat EC jointly with Dept. of Statistics, North Eastern Hill University (NEHU), Shillong.

Training Program on Statistical Analysis using R Programming

One weekonline Training program on Statistical analysis using R Programming was conducted from 24th Nov - 1st Dec 2020. The program was conducted by NIELIT Jorhat EC jointly with Dept. Of Statistics, Assam University, Silchar. Total 200 Candidates comprising both students and teacher from colleges and universities from different parts of the country participated in the training.

Special Training on Computer Application for Ph.D Students-RFRI

The 3rd batch of Special Training on Computer application for Ph D students of Rain Forest Research Institute (RFRI) was conducted from on 7th - 28th December 2020. The batch comprised of 7 PHD candidates.

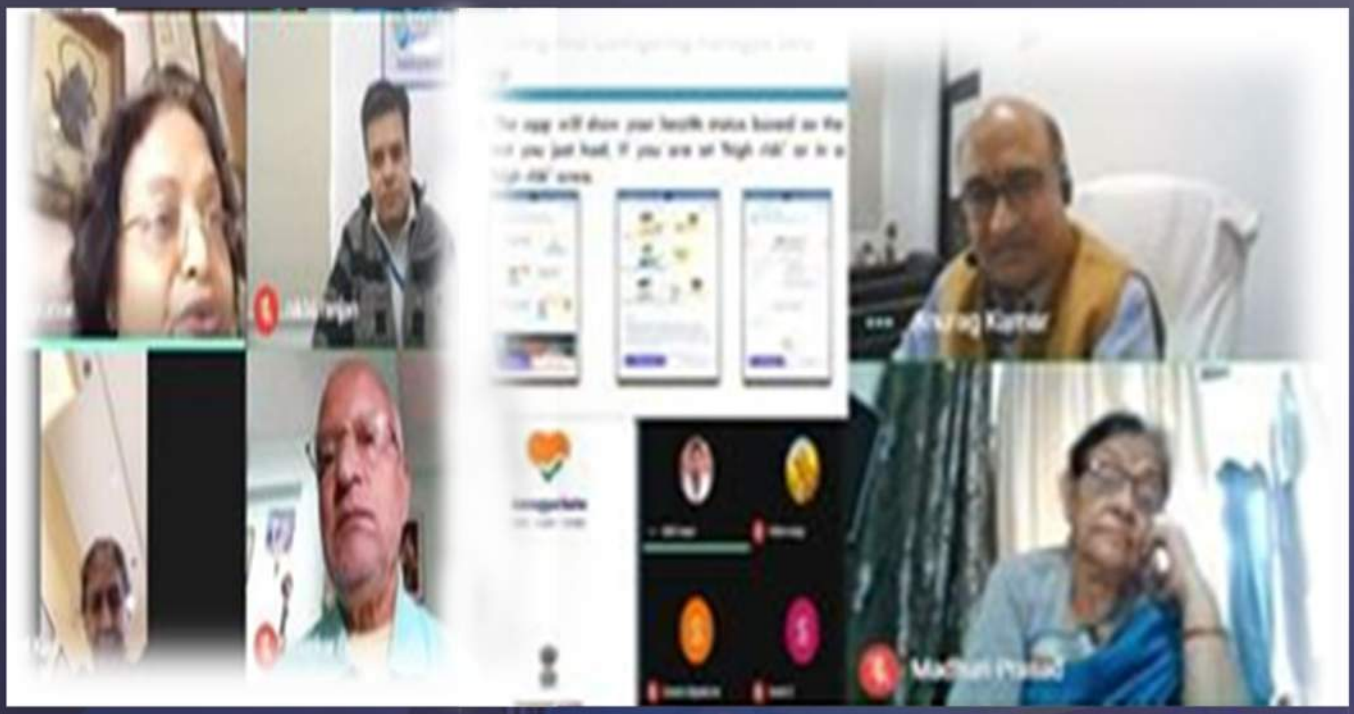
Winter Training on Robotics

NIELIT Guwahati successfully conducted training of the first batch of tiny minds during Winter Training in Robotics [From Dec 28, 2020 to Jan 5, 2021] for Class 1-IV students. Typing in English, Hindi & Assamese, making paper Robots, #Block_coding & assembling cum navigating Lego EV3 were the main attraction of the training programme.

Invited Talk Presented by Faculty Members of NIELIT Guwahati:

Date of the Invited talk	Topic	Presented by	Event details
02-Oct ,2020	Digital skill sets and inter-digital Collaboration and delivery in local languages	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati &Shillong	World Student Innovation Summit, Pune
22-Oct, 2020	Student-centric ICT learning & assessment, Flipped Classroom and Proctored exams etc	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati & Shillong	Online Refresher Course on "Emerging Issues in Information Communication Technology", sponsored event by UGC-HRD and conducted by Dr.B.AMartahwada University, Aurangabad (MS)
01-Nov,2020	Industry4.0, STEM education, AI Robotics for Children, post Covid-19 ICT based services in Academic, E-waste management, Agriculture, tourism, Healthcare etc	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati &Shillong	National Symposium on 'Innovative Technology & Management Dedicated to Sustainable Humanistic Face', Organized Jointly by Vivekananda Institute of Environment & Management and Jadavpur University [Kolkata]
2-Nov, 2020 & 14-Dec, 2020	Keynote address and A technical presentation on "Information Retrieval for Biological Analysis"	Dr. Saurov Mahanta, STO, NIELIT Guwahati	STTP title: "Implementation of Medical Image Processing using Advanced Green Computing Technology", sponsored by AICTE &organised by Department of Medical Electronics, Saveetha Engineering College (Autonomous) , Chennai.
10-Nov, 2020	Industry 4.0, Development method-Agile, XP and Scrum with respect to AI or Data Science	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati & Shillong	Webinar on 'Future Engineering with Data Science' organised jointly by NIELIT Guwahati and Assam Don Bosco University
27-Nov, 2020	Possible Data Analytics Models for e-Waste Management	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati & Shillong	International Computational Techniques & Intelligent Machines, [Springer] by Baba Farid College, Bathinda/Punjab
13 Dec, 2020	Panel Discussion on Startup and Funding.	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati & Shillong	In a webinar on 'Startup & funding', a panel discussion with Directors from NASSCOM, STPI, NIELIT and KEN
29 Dec,2020	E-Resources and Students Centric Teaching Practices	Dr. Y. Jayanta Singh, Director, NIELIT Guwahati & Shillong	Faculty Development Programme organised by Pravabati College, Mayang Imphal, Manipur

Free Awareness Programme for Senior Citizens/Housewives on 'Use of Mobile Applications for Digital Payment and e-Governance Services'



During this time of anxiety and uncertainty caused due to Covid -19 pandemic, people are facing various socio-economic barriers and digital literacy is a good way out to overcome this. Adhering to the thought that "Contributing to the Society is our duty not charity" NIELIT Haridwar has continued to conduct "One Week online Awareness Programme" on "Use of Mobile Applications for Digital Payment and e-Governance services" absolutely free-of-cost for "Senior Citizens/Housewives".

This programme is targeted to make senior citizens/housewives aware of the various e-Governance services launched by Government of India for the benefit of the citizens, with an objective to pave away their fear of using digital mediums. It is one week programme conducted for in online mode for one hour each day.

The programme proved to be very successful and the participants were able to fetch good knowledge about different government and non-government online platforms as well as about the precautions and security features necessary for safeguarding against common cyber frauds. As per the feedbacks received from the candidates, they feel more confident now and wish to take up various tasks such as electricity bill payment, generating Jeevan Praman Patra, gas booking, e-Hospital registrations, etc. from the ease of their home through digital medium. A total of 75 Sr. Citizens and Housewives have been benefited through this programme during Oct-Dec '20.

News From Calicut Centre

FPGA based Embedded System Design Covering Swadeshi Microprocessors

NIELIT Calicut has conducted Instruction Enhancement Program (IEP) on LMS based Embedded System Design on FPGA, Covering Swadeshi Microprocessors from 5th Oct-2nd Nov and from 30th Nov-11th Dec 2020. The programme is funded by MeitY and was conducted in line with the Swadeshi Microprocessor challenge announced by MeitY. The main motivation of the IEP was to promote and build Swadeshi processor based embedded system design ecosystem throughout the country. Under this IEP programs, NIELIT Calicut has established a remote reconfigurable embedded system design lab and have trained more than 1500 candidates in Swadeshi Microprocessor based embedded system design.

IEEE Workshop - Robotics and Automation

IEEE NIELIT Calicut SB jointly with Robotics and Automation Society chapter of IEEE Kerala Section hosted a webinar on "How to publish a quality Technical Paper with IEEE" on 29th Oct '20. A total of 400 participants attended the program, from across India. Dr. Dhanu kumar Pattanashetti, Senior IEEE Client Services Manager, IEEE India Operations Center, Bengaluru, Served as the Resource Person.

Customized Training for Larsen & Toubro - Hardware Design

NIELIT Calicut imparted training to 17 employees of Larsen & Toubro on Electronic Hardware Design Flow on 30 Sep 2020. The classes were handled by Dr.Jayaraj U Kidav , Sci./Eng. 'D'; Sh. Nandakumar R , Sci./Eng. 'D' and Sh. Manoj Kumar MK, STO. Larsen & Toubro has shown great appreciation in the programme.

Industrial IoT

NIELIT Calicut was part of industry-focused training program in the area of Industrial IoT (IIoT) organized by Wipro 3D that was held during 17th -23rd Dec '20. The major topics covered by NIELIT Calicut were Industrial IoT Communication Protocols, Node, Data flow from edge node device to Gateway database, IIoT Networks Security and data Encryption, IoT Dash boarding, Data Analysis and Data Analytics principles, Data Visualization and Analysis, Artificial Intelligence, Machine Learning and Deep Learning Case studies etc. Sh. Rajesh M, Sci./Eng.'D', Sh. Nandakumar R, Sci./Eng.'D', Ms. Vimala Mathew, Sci./Eng. 'E' and Sh.Prasoon KG,Pr.T.Owere the resource persons.

Explainable Artificial Intelligence

Introduction

Artificial Intelligence (AI) is a technique towards making the machines intelligent on the basis of certain advanced algorithms and the frameworks. The machines do take actions intelligently but even if their actions are neither desired ones nor optimal ones then also they do not provide the reason/justification behind taking the particular action. Explainable Artificial Intelligence (XAI) is a technique or set of frameworks and the tools that make the human being to understand and interpret the predictions that can be made the applied AI model [1]. It violates the Black Box concept of AI where even the algorithm/AI technique designer themselves are unable to explain or justify the reason why AI took particular action. Using XAI, even machines are made accountable under right to explanation. It helps in improving user experience for AI products and also helps users to trust that the AI enabled machines are making quite good decisions [2]. The goal of XAI is to make cooperation between AI and humans since humans are to accept AI generated prescriptions, so they need to trust them and the trust can be gained if proper justification for particular prescription be provided by AI enables machine.

There are four principles of XAI to be incorporated as per NIST (National Institute of Standards and Technology [6]): 1] Explanation, 2] Meaningful, 3] Explanation Accuracy & 4] Knowledge Limits. Because of explanation-oriented approach, what-if tools are gaining more attention as they provide exploratory analysis towards this. Popular Deep Learning libraries have started to include their own XAI libraries, such as Pytorch Captum and tensorflow tf-explain. Furthermore, the interpretability assessment criteria (such as reliability, causality, and usability) helps ML community keep track of how algorithms are used and how their usage can be improved, providing guiding posts for further developments [3]. The figure-1 can be seen to know the issues and the challenges to be faced by XAI along with the future prospects.

Apart from being used in Medical, XAI has also found a shining path in the field of Image processing, captioning and predictions were generally two parts are being used to make XAI functional:

Generation Part:

Generally based on Convolutional Neural Network (CNN)/Recurrent Neural Network (CNN) encoder-decoder framework. The encoder extracts a feature vector for the full image, and the decoder generates the words using the feature vector.

Explanation Part:

XAI is mainly used in the explanation part. It has two major roles depending on whether the generation part is in training or inferencing stage. During training, the explanation part generates loss, an image-sentence relevance loss, which digitises whether the generated caption considers the objects in the input image well. The objects are extracted by using an object detection algorithm. The more the generation part is trained, the better the model can generate a caption considering objects. During testing, the explanation part generates the weight matrix for the regions extracted from the input image and words generated from the generation part for the image. Each weight value represents the relevance between the object and the word in the pair. The explanation part has two components: (i) the region-word attention model and (ii) the interpretability enhancement (IE) model. The region-word attention model generates a weight matrix using the regions detected during object detection and the words in the generated caption. The IE model generates the image-sentence relevance loss using the weight matrix to assess whether a caption/other features generated from the generation part well-reflects the objects [5].

Conclusion

XAI is exploring other fields e.g IoT, mMTC, URLLC communication however it has found extensive usage and applicability in the area of medical sciences. It is the technique which may be incorporated with all existing or to be explored technologies. With this, the trustworthiness of machines increases, as the machines are being made accountable for their actions.

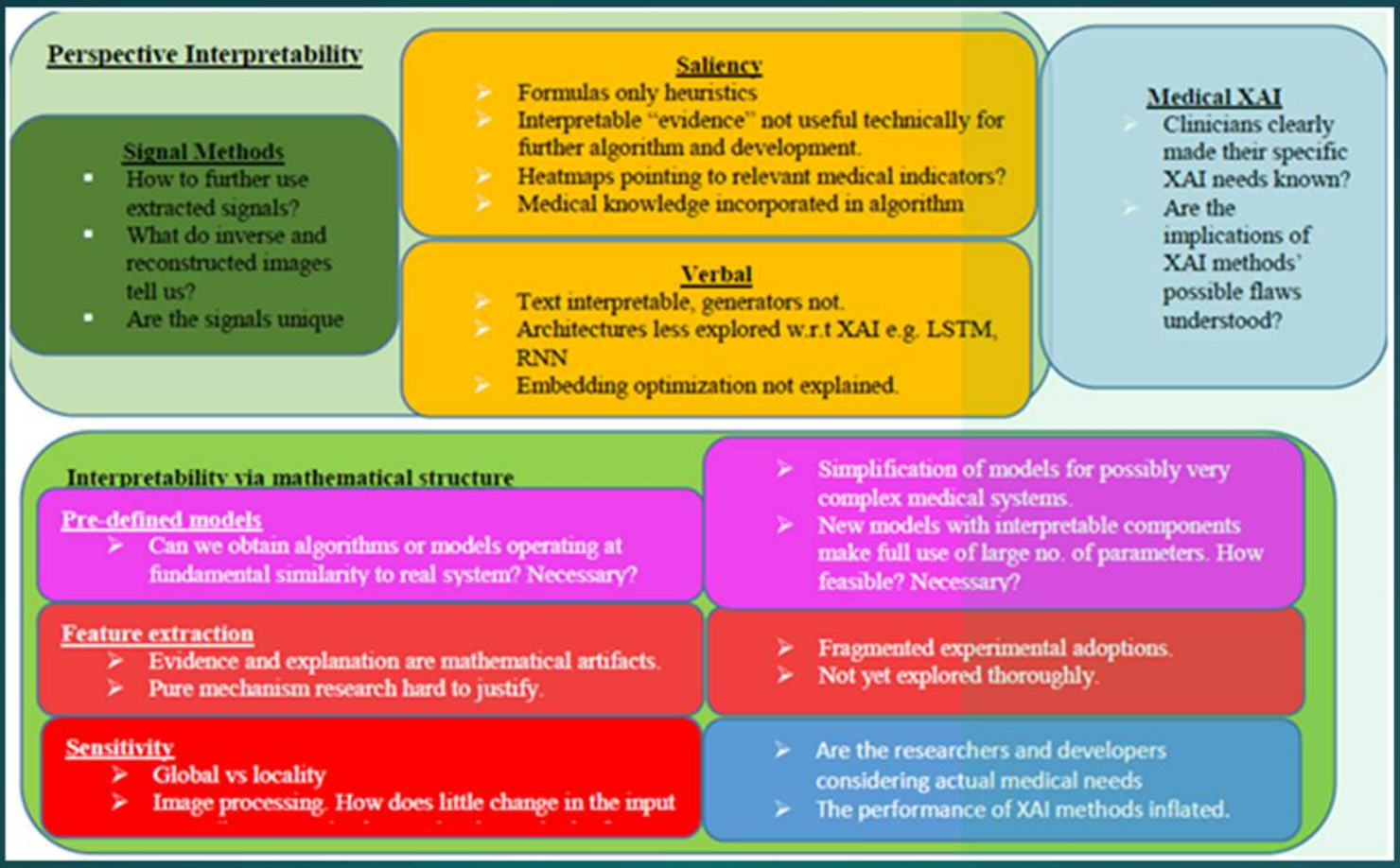


Figure 1 : Challenges and Future prospects of XAI in Medical Science

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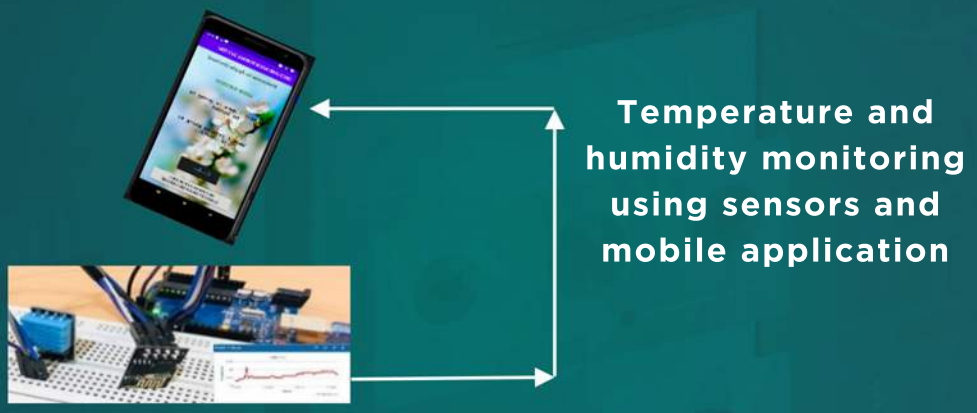
Utilization of IoT with Smart Mobile Application Development

Introduction

Internet of Things or IoT refers to the connection of physical devices or things with network. This technology has a huge contribution now a days in the diverse application areas[1]. In rapidly changing scenario, mobile applications are considered the best way for marketing any work or business digitally. The present study focuses on the utilization of IoT with the smart mobile application development. Mobile applications running on smart devices are important Supporter for internet of things. The study focuses on the integration of physical objects and external services for data and application management.

There are various types of mobile applications available now days which support IoT components, for e.g. – BLYNK app. BLYNK or any other application are designed for some specific purpose. So instead of using these types of applications, developers can create their own mobile applications for more specific purpose or according to user's requirement. For ex. Variation in environmental factor like temperature and humidity can cause to various diseases in plants and crops. So,there could be a possible solution to monitor the field's temperature and humidity level to control the diseases in crop. For this IoT components like DHT11 [Temperature and Humidity sensor], ESP8266 wi-fi transreceiver are used with Arduino. Google firebase provide the platform to connect and manage the mobile application data online with IoT sensors.[4]



Field's Monitoring using IoT Components and Mobile Application[5]

Summary

As it is known now days, every person wants to control the "things" by just a click or touch, this study reveals the utilization of IoT with mobile application development. The things are sensed and monitored by IoT components and related input data will be managed and controlled by supported mobile application.In a nutshell the present study describes the role of mobile application to control the things with the help of IoT Components.

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Big Data and Hadoop Security Issues

Introduction

Big data is a collection of data that is huge in volume, yet growing exponentially with time. It is a data with so large size and complexity that none of traditional data management tools can store or process it efficiently. This data can be generated from various sources such as social media, audios, photos, log files, sensor data, applications, web etc. Processing or analyzing this big data or extracting logical data is a daunting task. There are many Big Data processing solutions, but Hadoop is one of the most widely used technologies. In this article we will discuss the security issue that arises in the Hadoop Architecture base layer called the Hadoop Distributed File System (HDFS). For distributed application frameworks, security issues come into play when a large amount of confidential information is stored in an unencrypted database or in standard format.

Hadoop

Hadoop is an open source Java Framework technology that helps in processing large scale data at low cost, high fault tolerance and high scalability. Hadoop handles large amounts of data in a structured, semi structured and unstructured format.

HDFS architecture

HDFS is a reliable and distributed file system in the Hadoop framework environment. A Hadoop framework contains one Name node and many Data nodes. Using Commodity Hardware provides unwanted large data storage with low latency where it performs tasks such as "Write Once, Read More Times". The HDFS Architecture is shown in Fig: 1

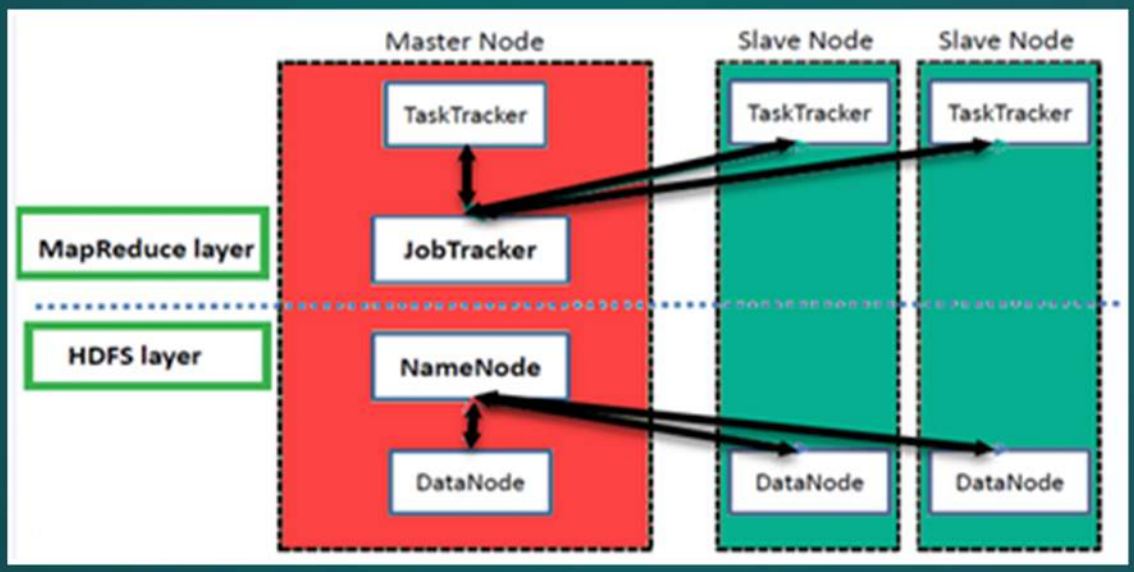

Figure1 : Hadoop Architecture

Security Issues on HDFS

HDFS is the basic layer of Hadoop Architecture containing different classification details and is very sensitive to security issues. HDFS does not have appropriate features in managing security issues. The risk of data acquisition, theft and unwanted disclosure occurs when embedding data in a single Hadoop location. Repetitive information is also unprotected requiring additional security to prevent breakage and vulnerability. Particularly Government Sectors and Organizations that never use the Hadoop environment to store important data due to low security concerns within Hadoop Technology. They offer security outside the Hadoop Environment such as a firewall and Intrusion Detection System. Some investigators have suggested that HDFS in the Hadoop area is securely restricted to prevent theft, being compromised only by encrypting block levels and individual file systems in the Hadoop Environment. Although some researchers encrypt the block using sites using the encryption process but no complete algorithm has been stated to maintain security in the Hadoop Environment.

HDFS Security Solution with Kerberos Mechanism

Kerberos is a network authentication protocol that allows a node to transfer any file over an unsecured channel with a ticket tool to verify their unique identification between them. This Kerberos method is used to improve security on HDFS. In HDFS communication between the client and the name node is available using Remote Procedure Call (RPC) and communication from the Client (client using HTTP) to the data node is obtained using Block Transfer. Here Token is used to verify RPC connections. If the Client needs to find token methods, the client uses the Kerberos Authenticated Connection. A Ticket Granting Ticket (TGT) or Service Ticket (ST) is used to verify a node name through Kerberos. Both TGT and ST can be regenerated after prolonged use while Kerberos is regenerated; the new TGT and ST are also released and distributed throughout the operation. Key Distribution Centre (KDC) issues a Kerberos Service Ticket using TGT after receiving a request from work and network traffic is avoided at KDC using the Tokens in name node, only for an extended period but the ticket remains unchanged. The big advantage is that, even if the ticket is stolen by the attacker it cannot be renewed. Fig: 2 show a view of the design of the Kerberos key distribution centre.

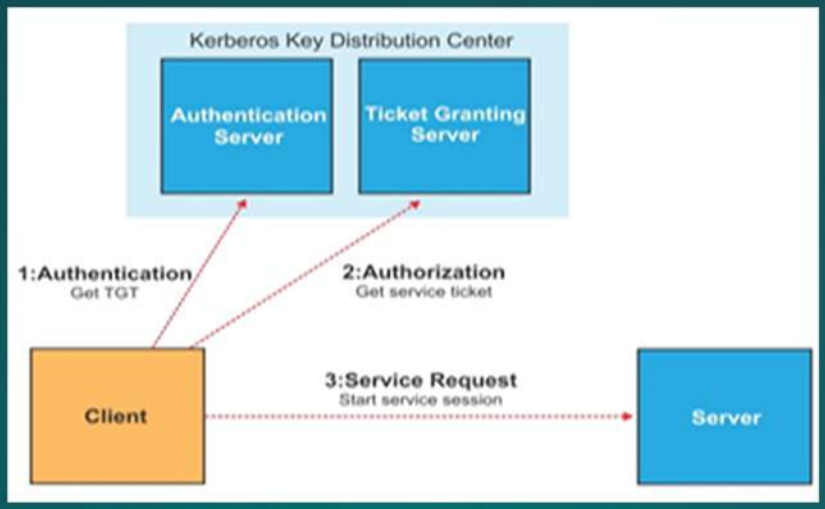

Figure 2 : Kerberos key distribution centre

Findings

This document discusses the Kerberos Mechanism for obtaining data from the Hadoop file system that is being distributed. This method is used to access data blocks properly and only by an authorized user. In the Kerberos Mechanism, Ticket Offer and Ticket Service play a major role in providing security by name node. If a client wants to access a block from a data node, they must first contact the name node to identify which data node contains the block files. The place name authorizes access to the file permission and issues a token called Block Token when data node verifies the token. The data node releases a token called Name Token in which it allows the Name node to enforce access control right on its data blocks. Block Token allows a data node to see if a client is authorized to access data blocks. Block token and Name Token are returned back to client containing data block at their locations. These methods are used to increase security by preventing unauthorized customer reading and writing on data blocks.

Conclusion

This article outlines Big Data security issues to increase security in the Big Data and Hadoop Framework. We can improve the security of big data by using the Kerberos Mechanism method in the Hadoop Distributed File System which is a layer in Hadoop, where it contains a large number of blocks.

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Blockchain Based Supply Chain Management

Introduction

Blockchain is a much talked about technology as many industries and people think that the use of blockchain will disrupt the industry. It is definitely one of the most disruptive technologies that came into existence since the start of the Internet as it is bringing drastic revolution. It is the main technology behind bitcoin, ether and many other cryptocurrencies which are prevalent today. This article describes the blockchain technology and further explains how the Supply Chain Management may undergo a revolution by the use of Blockchain. Companies like IBM have already started working on blockchain through IBM's blockchain for supply chain.

Blockchain

A Blockchain is a type of decentralized and distributed ledger which maintains a permanent and unmodifiable record of transactional data in a chronological order. It stores the transactions in a growing chained list of records which are called Blocks. Blockchain provides confidentiality and security by using cryptography to link and secure the blocks. Blockchain can also be applied for keeping records in a secure way across distributed network and make the data safe and indestructible. Blockchain in the future is going to eliminate corruption and remove role of third parties by eliminating the various intermediaries involved in different processes[1].

- **Decentralized:** All nodes have copy of the same data which is distributed across peer to peer network.
- **Cryptographic Facility:** Provides immutability property and tracking the chains of data and transactions over time. Keying works by using public and private keys for encryption and decryption of the transactions. Hashing allows chaining of the blocks in an immutable sequence.
- **Consensus Mechanism:** Integrity and quality is provided through the mechanism of consensus which ensures that transactions are encrypted and enforces time sequence of adding of blocks in the chain [2].

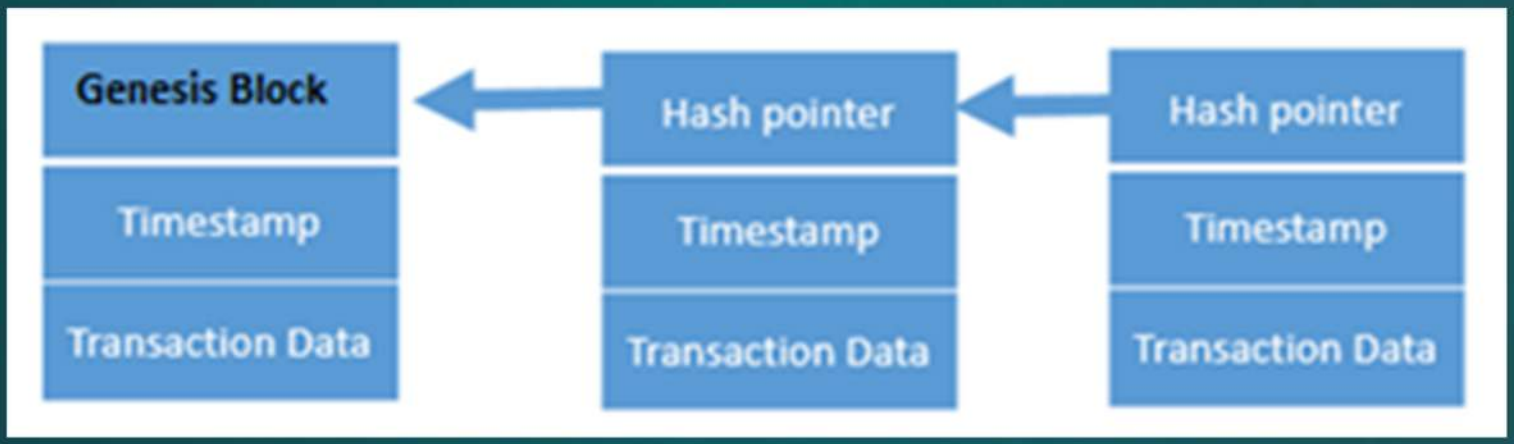

Figure 1 : Typical Blockchain structure

In a typical blockchain, each block typically contains three elements, a Hash pointerwhich is a link to the previous block, a timestamp, and transaction data (Fig 1). The first block known as genesis block will not have hash pointer to previous block.The blocks are added to chain with transactions on user request. The block is broadcasted to all nodes in network, once the block is validated the block is added and transaction gets verified and executed.

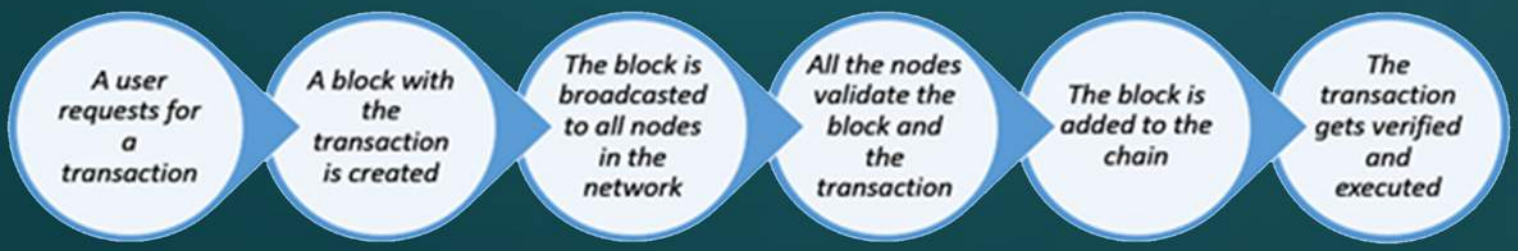

Figure 2 : How blockchain works

Supply Chain Management

The clothes that we wear, phones we use in day -to –day life, products we use in daily life go through many processes starting from confirmation of the order to the product being delivered.The processes like collecting the raw material, information, proper resources, manufacturing, shipping and then finally delivering the order that require organization with a number of people. So this whole process is called supply chain as all processes are connected to each other (Fig 3). The management of this supply chain is called supply chain management (SCM). In simple language flow of the finished good from the origin to the point of destination is supply chain management. The components in the supply required chain are Natural resources, Material, Ingredients and goods, finished Good, Retail and E-commerce, Costumer or consumer, Return or refund.This article explainsthe use of blockchain technology to make supply chain more productive and efficient.

Figure 3 : components of SCM

Blockchain for Supply Chain Management

- Provenance Tracking: As the organizations and companies have many elements that are part of thesupply chain management, it is difficultto track each and every element. This sometimes leads to consumer issues about the product and its quality. However, using the blockchain, track on every product and its complete history can be traced.
- Detect frauds: Blockchain also help to detect the fraud in any part of the supply chain.
- Cost reduction: By using blockchain the cost factor also gets reduced as the blockchain eliminatesthe middle man and intermediates which causes frauds or product duplicity.
- Immutability: Immutability means non-tampering. The data in the blockchain cannot be deleted or tampered ever. So this will make data secure and immutable.
- Transparency: The public key of the chain remains available publicly whereas transaction data is hashed. The identity of the person along with data remain hidden using cryptography hashing function. This hashed data remains available to all increasing transparency.

Advantages of using Blockchain based Supply Chain

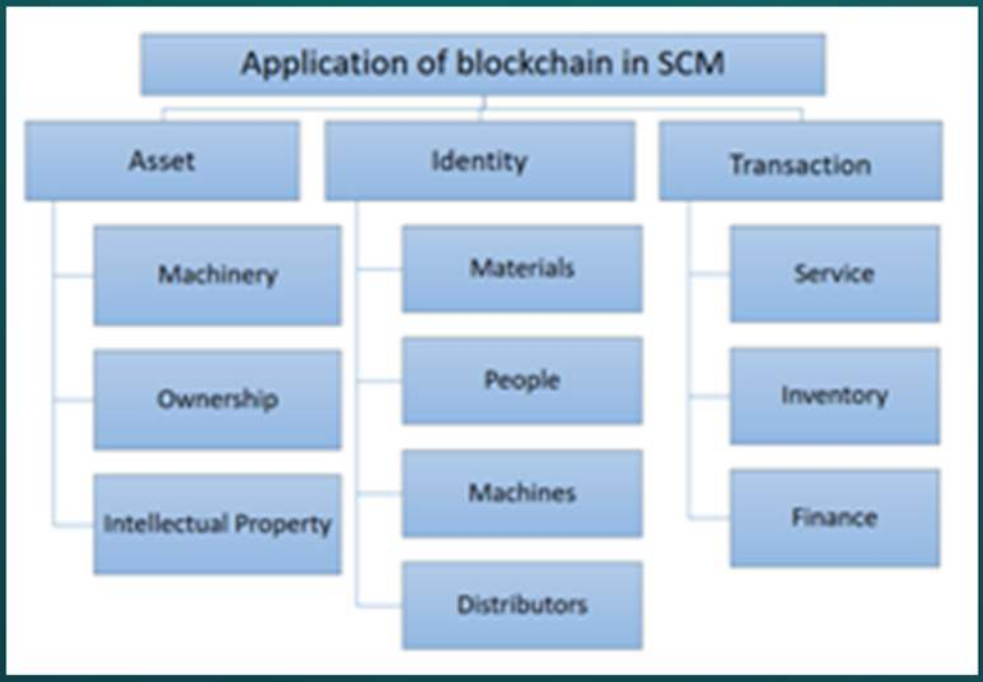

Figure 4 : Application based examples of blockchain in SCM

- Immutable records storage in blockchain
- Removal of middle man or intermediates.
- Easy to track the product from the day of manufacture till the end of life.
- Provide transparency to the consumer.
- Helps in providing all information about the manufacture process, assembly and delivery of the finished good.
- Reduce cost and delivery charges.
- Increases trust and transparency between seller and consumer.

The application based examples[3] of Blockchain technology in SCM spans across Asset Management, Identity Management, and Transaction Management (Fig. 4).

- Asset management has applications:-Smart product IoT configuration, Digital right management
- Identity based blockchain applications in SCM give advantage in Identity Management, Dynamic Smart Contract, Part Quality Records.
- Transaction based applications in SCM have Inventory control transactions, Supply Chain Traceability and Product origin assurance.

Conclusion

The blockchain technology can be used in many industries such as clothing, food, mobile, medicines etc. to strengthen the entire Supply Chain and efficiently track and manage the products. The blockchain technology will eliminate many problems in supply chain management. It will be de-facto standard for the bright future of SCM ecosystem.

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Salp Swarm Algorithm (SSA) based VM Migration Strategy in Cloud Computing Platform

Introduction

Cloud computing has emerged as a mainstream service-oriented architecture [1]. Cloud supports efficient storage and processing of huge data due to its scalable nature and availability of huge infrastructure. However, large-scale applications of cloud computing brings increasing number of tasks and surging amount of workloads [2]. Due to different computing capacities of Virtual Machines (VM) and uneven task scale, some computing nodes within cloud may be underutilized while others may be overloaded, resulting in unbalanced load distribution [2][3]. Therefore, it is imperative to spread the loads across computing nodes to take full advantage of cloud computing system and consequently improve user satisfaction [2]. As cloud computing is increasing, and clients are demanding various services and optimal outputs, Load Balancing (LB) plays a significant role in cloud computing. If several tasks are covered on certain nodes, tasks could be converted from heavy-burdened nodes into light-burdened nodes for mitigating the waiting time of tasks, which is known as LB [4]. This can be achieved by carrying our virtual machine migration optimally.

Vm Migration Strategy

The cloud model comprises of various Physical Machines (PMs) for solving the requests from the users, and a PM has the collection of VMs for processing the tasks dynamically. The VM in the cloud is utilized for reducing the bottleneck problems arising in the cloud platform, and also, the virtualization improves the speed of operation [5]. Here, the set of VMs is controlled by the PM; the cloud model has the load balancer, which constantly checks the load of the PM.

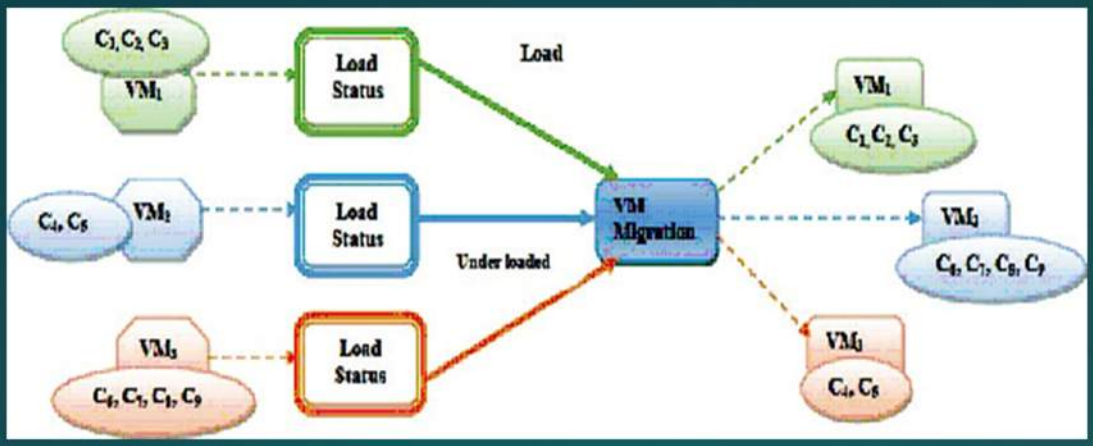

Figure 1 : VM Migration Strategy

When the load of the PM exceeds a threshold value, the VM is said to overload PM, and the load balancer migrates the underloaded VM to PM which has overloaded VM and vice versa to balance the load of the system. Fig.1.1. depicts VM migration strategy in which VM consists of various data chunks such as *C1 ,C2 ,C3 ,C4 ,C5 ,C6 ,C7 ,C8*

Problem Formulation

We consider that there are total K virtual machines which are processing data which are represented as **V= {V1,V2,...,Vk}.** Based on memory and CPU utilization, current load of each VM i.e. Load_factor is evaluated and VMs are classified into overloaded and underloaded category.

After effectively classifying overloaded and underloaded VMs, the next procedure is to select the appropriate VMs from the underloaded machine for the migration which shall help to maximise the balance of resource utilization. If the VM exceeds the threshold value, then the VM is migrated to the underloaded VMs, and the suitable VM for the migration is assigned using optimization algorithm. An efficient VM migration strategy which is based on Swarm Salp Algorithm (SSA) [6] is applied to perform VM migration optimally. The best VM migration is evaluated based on the metric such as resource availability (Memory utilization & CPU utilization).

In this work, mean value of load rates of all the currently running VMs is utilized to measure the load balancing effect of the system and is expressed below:

$$mean(Load\_factor) = \frac{1}{m}\sum_{j=1}^{m}(\textbf{Load\_factor}(V_j)) \quad \text{---------- (1)}$$

Where m is the number of VMs currently executing tasks.

Also, we have evaluated the resource availability state of the system which is defines as below:

$$(VMs) = \frac{1}{m}\sum_{j=1}^{m}(C_j - CU_j) \quad \text{---------- (2)}$$

Where C_j indicates j^{th} VM and CU_j signifies the utilization of capacity in j^{th} VM.

The steps considered in the proposed strategy to choose optimal VM for initiating migration are described as follows:

Algorithm VM Migration strategy using SSA	
1: Initialization of population;	5: Evaluation;
2: Calculate fitness for each solution using Eq. (3)	6: end while
3: while(count<= maximum number of iterations) do	7: return best_sol;
4: Location Update;	8: end

Initialization

The cloud model comprises of various Physical Machines (PMs) for solving the requests from the users, and a PM has the collection of VMs for processing the tasks dynamically. The VM in the cloud is utilized for reducing the bottleneck problems arising in the cloud platform, and also, the virtualization improves the speed of operation [5]. Here, the set of VMs is controlled by the PM; the cloud model has the load balancer, which constantly checks the load of the PM.

Calculation of fitness function

The fitness to choose the suitable VM for the migration from the overloaded VM to the underloaded VM is done based on the fitness function. This work defines a maximization fitness function, which is formulated based on the mean value of load _factor and the Resource Availability. The fitness function is expressed as follows:

$$Fitness = (1 - mean(Load\_factor)) + RA(VMs) \quad \text{---------- (3)}$$

The best solution best_sol is the one which has maximum fitness value amongst all the solutions. Calculate the fitness value of all the solutions and put the solution with maximum fitness value in *best_sol.*

Location Update

For location update, the solution is classified into two groups, such as leader and followers. The leader is nothing, but the salp at the front of the chain, whereas the remaining salps are considered as followers. The update equations used are as per the equations given in SSA algorithm [6].

Evaluation

Calculate the fitness value of new set of population derived after location update. The best solutioniter_best_sol is the one which has maximum fitness value amongst all the solutions in a particular iteration. best_solis replaced by iter_best_sol if the value of iter_best_sol is better/greater than *best_sol.*

Conclusion

This article proposes an approach for load balancing in cloud computing environment using optimization algorithm, Salp Swarm Algorithm (SSA). In the developed approach, local migration agent is utilized for monitoring the memory and utilization of resources in the cloud continuously and the load are balanced by migrating the VMs to the PMs, based on the requirement of the VMs to complete a task assigned.

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सेल्युलर नेटवर्क

Q1- Cellular network किस तरह का होता है, 1G से 5G तक का सफर?

i- एक मोबाइल नेटवर्क बेस स्टेशनों का एक जाल होता है । प्रत्येक बेस स्टेशन अपने चारों तरफ एक सीमित क्षेत्र जिसे "Cell" कहते हैं को ही कवर कर सकता है। इसलिए मोबाइल नेटवर्क को "सेलुलर नेटवर्क" भी कहा जाता है। संवाद करने के लिए, एक मोबाइल उपयोगकर्ता को बेस स्टेशनों की सीमा के भीतर होना जरूरी है । यह सुनिश्चित करने के लिए कि उपयोगकर्ता हमेशा कॉल करने में सक्षम हों , ऑपरेटर हजारों Cell को तैनात करते हैं। सेल्स एंटेना से लैस होते हैं और ओवरलैप करते हैं ताकि वो उपयोगकर्ताओं के वर्तमान लोकेशन के साथ हमेशा संपर्क में रहें । एक Cell का आकार कई कारकों पर निर्भर करता है जैसे कि भौगोलिक परिस्थितियां (मैदान, पहाड़, घाटियाँ इत्यादि), स्थापना का स्थान (ग्रामीण या शहरी क्षेत्र) और जनसंख्या घनत्व।

ii- 1979 में टोक्यो में निप्पॉन टेलीग्राफ और टेलीफोन (NTT) द्वारा मोबाइल नेटवर्क – की पहली पीढ़ी 1G लॉन्च की गई । 1983 में, अमेरिका ने भी 1G संचालन को मंजूरी दी और मोटोरोला का डायनाटैक पहले 'मोबाइल' फोन में से एक बन गया। 1G तकनीक में कवरेज खराब था और ध्वनि की गुणवत्ता भी कम थी। कॉल भी एन्क्रिप्ट नहीं किए गए थे, इसलिए कोई भी सुरक्षा नहीं थी ।

iii- फिनलैंड ने 2G मोबाइल नेटवर्क जोकि GSM मानक पर आधारित था 1991 में शुरू किया और 1 जी के Analog अतीत से डिजिटल के उज्जवल भविष्य का रास्ता खोल दिया। डिजिटल वॉयस कॉल काफी स्पष्ट थे और पहली बार, कॉल एन्क्रिप्ट किया जा सकता था, लोग अपने फोन पर [SMS] Picture और मल्टीमीडिया संदेश (MMS) भेज सकते थे।

iv- 2001 में NTT DoCoMo द्वारा 3G को लॉन्च किया गया था और इसने उपयोगकर्ताओं को दुनिया के किसी भी स्थान से डेटा एक्सेस करने में सक्षम बनाया। इससे वीडियो कॉन्फ्रेंसिंग, वीडियो स्ट्रीमिंग और आईपी पर आवाज (जैसे स्काइप) जैसी नई सेवाओं का उदय हुआ । 2002 में, ब्लैकबेरी लॉन्च किया गया था, और इसकी प्रसिद्द विशेषताओं 3G कनेक्टिविटी पर आधारित थी । 3G के युग ने अपने अंतिम पड़ाव 2007 में iPhone का लॉन्च देखा जिसने मोबाइल की दुनिया को बदल कर रख दिया।

v- 4G को पहली बार 2009 में स्टॉकहोम, स्वीडन और ओस्लो, नॉर्वे में लांच किया गया। यह लॉन्ग टर्म इवोल्यूशन (LTE) मानक पर आधारित था और इसने उच्च गुणवत्ता वाले वीडियो स्ट्रीमिंग को एक वास्तविकता बना दिया । 4G प्रति सेकंड 1 GB तक की स्पीड प्रदान कर सकता है। हालाँकि 4G प्रयोग करने के लिए विशेष डिजाइन के मोबाइल उपकरणों की आवश्यकता पड़ती है । यह Apple Company के उदय के पीछे एक मुख्य कारण था जोकि दुनिया की पहली ट्रिलियन डॉलर कंपनी बन गयी ।

vi- 1 दिसंबर 2018 को, दक्षिण कोरिया 5G (पांचवीं पीढ़ी के मोबाइल वायरलेस मानक) की पेशकश करने वाला पहला देश बन गया। 5G में, सेलुलर तकनीक को 20 Gbps तक वायरलेस नेटवर्क गति बढ़ाने के लिए कुशलतापूर्वक संशोधित किया गया है, जिससे नेटवर्क की देरी 1 मिलीसेकंड या उससे भी कम हो जाये । वर्चुअलाइजेशन और सॉफ्टवेयर परिभाषित नेटवर्क (SDN) जैसी तकनीकों ने 5G नेटवर्क को अधिक कुशल और कम खर्चीला बना दिया है। 5G के दो मुख्य मंत्र हैं:

a) ABC (Always Best Connected)

b) ASR (Always Sufficient Rate)

Q2- 5G का क्या फायदा होगा ?

5G की वजह से प्रकाश बल्ब, थर्मामीटर और यहां तक कि रेफ्रिजरेटर जैसे उपकरण ऑनलाइन जुड़े होंगे। उपयोगकर्ता एक साधारण ऐप का उपयोग करके इन उपकरणों को दूर से उपयोग करने में सक्षम होंगे। हालाँकि, 5G एक तेज मोबाइल नेटवर्क या ढेरों स्मार्ट फोन function से कहीं अधिक है। यह कई Vertical उद्योगों को सक्षम करेगा जिससे कई नई सेवाओं की शुरूआत करने में में मदद मिलेगी जैसे की:

i- चिकित्सा जगत में, चिकित्सक–से–चिकित्सक परामर्श, घर पर निगरानी और वीडियो–आधारित टेलीमेडिसिन जैसी

ii- सेल्फ–ड्राइविंग कारों में, सूचना का त्वरित वितरण उन्हें बेहतर और सुरक्षित बना देगा।

iii-दुर्घटनाओं में आपातकालीन सेवाओं की तेजी से तैनाती संभव होगी।

iv-कनेक्टेड सेंसर जो प्राकृतिक आपदाओं का जल्द पता लगाएंगे और चेतावनी देंगे।

v- आपातकालीन स्थिति प्रतिक्रिया में तेजी लाने और समर्थन करने के लिए ड्रोन एक प्रमुख उपकरण बन जाएगा।

vi-डिजिटल प्रतिकृतियां जो समय से पहले वास्तविक मशीनरी दोषों के बारे में चेतावनी देंगी।

Q3- 5G की कार्यप्रणाली के बारे में क्या मुख्य बातें जानना जरूरी है:

5G की कार्यप्रणाली के बारे में यह 7 मुख्य बातें जानना जरूरी हैं।

i- 5G 30 & 300 GHz के बीच Frequency स्पेक्ट्रम पर आवंटित "मिलीमीटर तरंगों" या "लघु wavelength रेडियो संकेतों" का उपयोग करता है। ये तरंगें न तो लंबी दूरी की यात्रा कर सकती हैं और न ही दीवारों में प्रवेश कर सकती हैं । यह नमी और प्लांट्स द्वारा भी आसानी से अवशोषित हो जाती हैं।

ii- डेटा प्रसारित करने और प्राप्त करने के लिए "छोटे सेल टॉवर" 200 & 1000 फीट की दूरी के भीतर स्थापित किए जाएंगे ताकि सिग्नल बिना Fading के लंबे समय तक यात्रा करने में सक्षम हों। 5G मुख्य रूप से बेस स्टेशन के साथ संचार करने के लिए [High Power] Low Frequency टावरों की जगह पर [Low Power] High Frequency Small Cells को लगाने पर काम करता है ।

iii-Data Traffic Signalling को संभालने के लिए, "बीमफॉर्मिंग" का उपयोग छोटे सेल से उपयोगकर्ता को सीधे डेटा भेजने के लिए किया जाता है । चूंकि सिग्नल अधिक केंद्रित होगा, इसलिए यह Interference भी कम कर देगा।

iv-चूंकि छोटे Cell में अधिक Antenna स्थापित किए जाएंगे, 5G MIMO या "मल्टीपल–इनपुट मल्टीपल–आउटपुट" का समर्थन करेगा, जो किसी भी समय अधिक Signal भेजने और प्राप्त करने में सक्षम होंगे ।

v- 5G नेटवर्क में, डेटा को एक ही Frequency का उपयोग करके बेस स्टेशन ट्रांससीवर्स पर प्रसारित और प्राप्त किया जा सकता है ।

vi-5G नेटवर्क Slicing जैसी सुविधाएं प्रदान कर सकता है जहां प्रत्येक Slice संसाधनों को बर्बाद किए बिना एक विशिष्ट सेवा प्रदान करेगी ।

vii- "मानकीकृत Building Block Protocol और System" पर निर्भरता बढ़ाने के लिए, 5G उच्च–स्तरीय Network Functions के लिए Software का उपयोग करता है जो पहले भौतिक उपकरणों द्वारा किए जाते थे।

Q4: क्या 5G सार्वजनिक स्वास्थ के लिए हानिकारक हो सकता है?

i-क्यूंकि 5G High Frequency मिलीमीटर Radio Signals का उपयोग करता है, जहां कई छोटे Cell लोगों के निकटता में स्थापित होते हैं | ऐसे चिकित्सक हैं जो चेतावनी देते हैं कि निरंतर Radiation लोगों को नुकसान पहुंचा सकता है।

ii-हालांकि, WHO (विश्व स्वास्थ्य संगठन)) का कहना है कि व्यापक अनुसंधान के बावजूद, आज तक कोई सबूत नहीं है कि "निम्न स्तर के विद्युत चुम्बकीय क्षेत्र" के संपर्क में आना मानव स्वास्थ्य के लिए हानिकारक है।

iii-हानिकारक रेडियो तरंगें, गामा किरण और एक्स–रे किरणों की रेंज में आती हैं |
iv-5G माइक्रोवेव रेंज की रेडियो तरंगों का उपयोग करता है।
v- इसके अलावा, माइक्रोवेव ओवन के विपरीत (जो भोजन पकाने के लिए उच्च ऊर्जा का उपयोग करता है), 5G के Small Cell रेडियो संकेतों को प्रसारित करने और प्राप्त करने के लिए कम ऊर्जा का उपयोग करते हैं।

Q5: 5G के आने से Cyber security के लिए किस तरह के challenges हो सकते हैं?

आधुनिकीकरण के दृष्टिकोण से, 5G प्रकाश की एक चमक की तरह है, लेकिन साइबर सुरक्षा दृष्टिकोण से, 5G एक नए प्रकार के साइबर–युद्ध के लिए एक प्रजनन मैदान है। तेज नेटवर्क न केवल Hackers के खतरे को बढ़ाता है, यह वायरस के तेजी से फैलाव में भी सहायक होता है । 5G सेवाओं के लिए सुरक्षा तब तक नहीं बनाई जा सकती जब तक कि Network का बुनियादी ढांचा मजबूत न हो।

i-पारंपरिक नेटवर्क में, Function Network Elements (NEs) की सुरक्षा काफी हद तक इस बात पर निर्भर करती है कि उनकी भौतिक इकाइयाँ एक दूसरे से कितनी अच्छी तरह अलग हो सकती हैं। हालाँकि, 5G में, यह काम नहीं करेगा, क्यूंकि "Virtual Function Network Elements (NEs)" Cloud–आधारित इन्फ्रास्ट्रक्चर पर होंगे ।

ii-5G उच्च स्तरीय Network Functions के लिए Software का उपयोग करता है जो पहले भौतिक उपकरणों द्वारा किए जाते थे। एक हमलावर जो नेटवर्क को प्रबंधित करने वाले सॉफ्टवेयर के नियंत्रण में सफल हो जायेगा वह नेटवर्क को भी नियंत्रित करने में सफल हो जायेगा ।

iii- इसमें कोई संदेह नहीं है कि Software Defined Network (SDN) ट्रांसमिशन दक्षता और संसाधन Configuration को बेहतर बनाने में उपयोगी है। लेकिन 5G सिक्योरिटी डिजाइन में SDN Flow table का सुरक्षित और सही प्रवर्तन होना आवश्यक है।

iv-5G सुरक्षा डिजाइन में Virtual Network Slices को अलग–थलग करने, तैनात करने और प्रबंधित करने के मुद्दे बहुत महत्वपूर्ण हैं।

v- 5G प्रणाली में, यूनिवर्सल इंटीग्रेटेड सर्किट कार्ड (UICC) और यूनिवर्सल सब्सक्राइबर आइडेंटिटी मॉड्यूल (USIM) के माध्यम से "विश्वास तय होता है"। हालांकि, नए Trust Model का सुरक्षित रूप से उपयोग करने के लिए नए Hardware और Software के विकास की आवश्यकता है।

vi-5G में सुरक्षा के लिए एक सुरक्षित बायोमेट्रिक प्रमाणीकरण प्रणाली जो "पहचान की चोरी" और उपकरणों तक "अनधिकृत पहुंच" को रोक सकती है की आवश्यकता है।

vii-"यूरोपियन यूनियन एजेंसी फॉर नेटवर्क एंड इंफॉर्मेशन सिक्योरिटी (ENISA)" ने चेतावनी दी है कि चूंकि वर्तमान Signalling Protocol (SS 7) 2G, 3G और 4G नेटवर्क के लिए विकसित किए गए हैं, अगर 5G नेटवर्क में उनका उपयोग किया जाता है तो यह असुरक्षित साबित हो सकते हैं । इसलिए, 5G नेटवर्क की सुरक्षा के मद्देनजर इन प्रोटोकॉल को अपडेट और सुरक्षित करना आवश्यक है।

viii-हालांकि, चूंकि 5G मुख्य रूप से Software और Cloud–आधारित है, इसलिए Data गोपनीयता प्रदान करना आसान होगा।

Q6: 5G सेवाओं की सुरक्षा के लिए क्या तैयारी जा रही है?

मार्च 2019 में यूरोपीय आयोग द्वारा जारी सिफारिशों के आधार पर यूरोपीय संघ के सदस्य राज्यों ने 5G Network सुरक्षा के समन्वित जोखिम मूल्यांकन" पर एक Report जारी की जिसके कुछ मुख्य बिंदु हैं:

i- 5G उपकरण के एकल आपूर्तिकर्ता का उपयोग करने के संभावित नुकसान (जैसे चीनी प्रौद्योगिकी दिग्गज Huawei नेटवर्क इन्फ्रास्ट्रक्चर) जैसे की आपूर्तिकर्ता की व्यावसायिक भलाई पर निर्भरता के साथ–साथ दूरसंचार आइटम्स की सप्लाई, नेटवर्क के बुनियादी ढांचा और Malware के हमलों सहित अनेकों मुद्दों पर एकल आपूर्तिकर्ता पर पूर्ण निर्भरता।

ii- उपकरण प्रदाता की गतिविधियों में राज्य–स्तरीय हस्तक्षेप की संभावित संभावना।

iii-विक्रेताओं की अनुचित Software विकास प्रक्रियाओं के कारण कमजोरियाँ संभव हैं।

iv-5G बुनियादी ढांचे की विभिन्न परतों की खामियों के कारण महत्वपूर्ण Applications में पिछले दरवाजे से पहुंच संभव है।

v- अगर "नेटवर्क स्लाइस" मजबूती से पृथक और संरक्षित नहीं होंगे, उनके परिणामस्वरूप Data Leak हो सकता है।

vi-वर्तमान 3G PP (3rd Generation Partnership Project) मानक जो मुख्य रूप से मोबाइल टेलीफोनी प्रोटोकॉल पर लागू होते हैं, 5G की चुनौतियों का पूरी तरह से समाधान नहीं कर सकते हैं।

vii-5G की नई सुरक्षा आवश्यकताओं को अभी तक राज्य स्तर पर शोध, तैयार और अपनाया जाना बाकी है।

Q7: 5G नेटवर्क के इम्प्लीमेंटेशन की तैयारी की दृष्टि से आप क्या सुझाव देना चाहेंगे?

कमजोर साइबर स्पेस फाउंडेशन के शीर्ष पर 5G का निर्माण करना रेत पर निर्माण करने जैसा है। दूरसंचार विभाग (DoT) और भारतीय दूरसंचार नियामक प्राधिकरण (TRAI) 5G मानदंडों को मानकीकृत करने के लिए EU में अपने समकक्षों के साथ काम कर रहे हैं । कुछ सुझाव निम्नानुसार हैं:

i-एक नई कॉर्पोरेट संस्कृति होनी चाहिए जहां साइबर जोखिम को एक आवश्यक कॉर्पोरेट कर्तव्य के रूप में माना जाए।

ii-5G पर साइबर हमले सॉफ्टवेयर हमले होंगे ; उन्हें सॉफ्टवेयर सुरक्षा के साथ काउंटर करने की तैयारी करनी पड़ेगी ।

iii-सभी कंपनियां जो 5G वितरित करेंगी– चाहे बड़े नाम के ब्रांड या छोटी स्थानीय कंपनियों सबके पास सक्रिय साइबर सुरक्षा कार्यक्रम हों।

iv-Software–आधारित सेवाएं प्रदान करने वाली कंपनियां हर नए Project के लिए किये जाने वाले Design और उत्पादन में साइबर सुरक्षा आवश्यक रूप से सम्मिलित करें।

v- उपभोक्ताओं को साइबर सुरक्षा के बारे में कम जागरूकता है और कोई अंतर्दृष्टि नहीं है। "पोषण लेबलिंग" की तरह, अधिकृत लैब्स द्वारा "साइबर सुरक्षा लेबलिंग" काफी उपयोगी साबित होगी।

vi-हमें सक्रिय रूप से 3G तक जनरेशन पार्टनरशिप प्रोजेक्ट (3GPP) के साथ जुड़ना चाहिए, जो एक उद्योग समूह है जो सर्वसम्मति के आधार पर निर्णय लेकर 5G के लिए मानक सेटिंग प्रक्रिया को नियंत्रित करता है। वर्तमान में, इसमें चीनी 5G उपकरण कंपनी Huawei सबसे अधिक योगदान दे रही है।

संजीव कुमार गुप्ता, नाइलिट, औरंगाबाद

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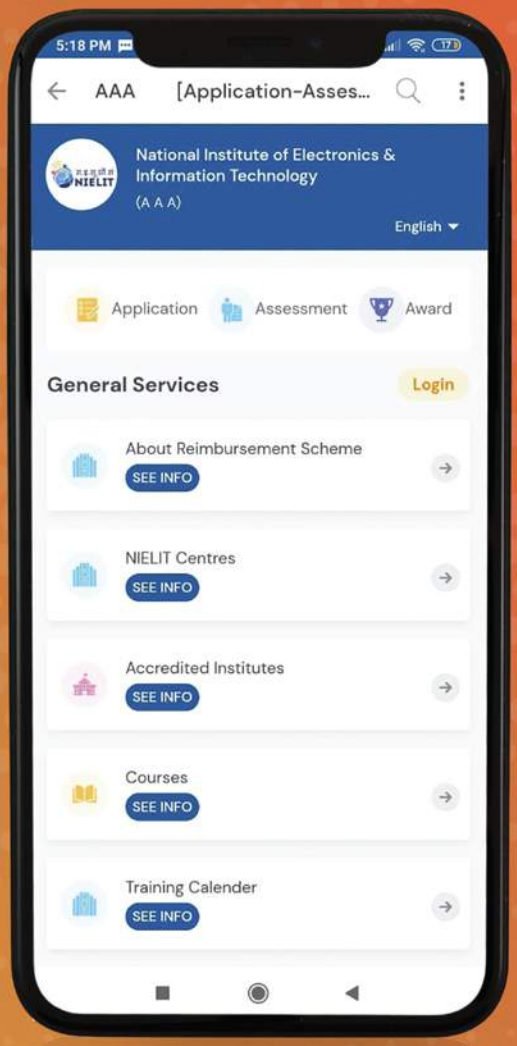

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