REPORT OF FIVE-DAY ONLINE STTP 2.0 ON "BLOCKCHAIN TECHNOLOGY AND ITS EMERGING APPLICATIONS"

Jointly Organized By:

Chhotubhai Gopalbhai Patel Institute of Technology,

Uka Tarsadia University, Gujarat, India **And**

Central Institute of Technology, Kokrajhar, Assam, India

(4^{th} - 8^{th} July, 2023)

Target Audience: Under Graduate, Post Graduates, Research Scholars and Faculty Members

No of Participants: Total **85** (Boys-50), (Girls-35), (Faculties-18**)**

Detail Report on the Five-day Online STTP 2.0

Blockchain Technology and Its Applications

STTP Title	BLOCKCHAIN TECHNOLOGY AND ITS EMERGING APPLICATIONS
Number of days	Five Days
Number of Sessions	15
Organizing secretary	Prof. (Dr.) Anshuman Kalla and Prof. (Dr.) Pranav Kumar Singh
Coordinators	Prof. (Dr.) Pankaj Pratap Singh and Ms. Monali Gandhi
Numbers of Institutes Participated	Manipal University Rajasthan, NIT Surat, CGPIT from Bardoli, Nirma University from Ahmedabad, PPSU from Surat, SRMIST from Chennai, CITK from Kokrajhar.
Numbers of Faculties	Computer / IT Engineering
Numbers of Participants	Computer / IT Engineering (85)
Objectives of the Workshop	The objective of STTP is to provide opportunity to students, faculty members and industry person to acquire knowledge and get practical exposure on how to design and develop blockchain-enabled Decentralized Applications (DApps). In particular the proposed STTP was beneficial for beginners, academics and researchers.
Outcomes of the Workshop	• Beginners got idea about Blockchain Technology and different research directions in this area
Speakers	**Dr. Pradeep Kumar, Dr. Mayank Aggarwal, Mr. Raaj Anand Mishra, Dr. Sandip Chakraborty, Mr. Roshan Singh, Dr. Sudeep Tanwar, Mr. Tharaka Mawanane Hewa, Mr. Maharaj Brahma, Dr. Rakesh Tripathi, Dr. Ajay Pratap**
General Feedbacks/ Suggestions	Overwhelming positive feedbacks have been received from Participants on the conducted STTP and suggested to conduct more hands-on sessions on the Blockchain technology and smart contracts.

Program Schedule

Day-1 (Tuesday, 4th July, 2023)	
9.00-11.00 AM	**Cryptographic Primitives - Pre-requisites for Blockchain** Dr. Pradeep Kumar, Assistant Professor, Department of CSE, Research Lab, Swansea University, United Kingdom, (UK).
11:00 - 11:30AM	**Break**
11:30 AM to 12:30PM	**History of Blockchain and Its Evolution** Dr. Mayank Aggarwal, Professor and Head, Department of CSE, Gurukul Kangri University, India.
12..30 PM to 01.30PM	**Lunch Break**
1.30 PM to 3.30 PM	**Block Structure and Mining (PoW)** Dr. Mayank Aggarwal, Professor and Head, Department of CSE, Gurukul Kangri University, India.
Day-2 (Wednesday, 5th July, 2023)	
9:00AM to 11:00 AM	**Distributed Ledger Technologies (DLT), Its Types, and Blockchain Evolution (1.0 to 4.0)** Dr. Sudeep Tanwar Professor and Senior IEEE Member Department of Computer Science and Engineering, Institute of Technology, Nirma University, Gujarat, India
11:00AM to 11:30AM	**Break**
11:30 to 12:30PM	**Smart Contracts and Its Application Towards Dapps** Dr. Mayank Aggarwal Professor & Head, Department of Computer Science & Engineering Gurukul Kangri University, India
12:30PM to 1:30PM	**Lunch Break**
1:30PM to 3:30PM	**Consensus Mechanisms in Blockchain - Need, Types, Characteristics, and Comparison** Dr. Sandip Chakraborty Associate Professor Department of Computer Science and Engineering

	IIT Kharagpur, India
Day-3 (Thursday, 03rd November, 2022)	
9:00AM to 11:00 AM	**Hands-on session on Introduction to Ethereum and Smart Contracts with development setup** Mr. RaajAnand Mishra UI/UX Engineering Lead, Dell Technologies, Bangalore, India
11:00AM to 11:30AM	**Break**
11:30 to 12:30PM	**Demonstration DApp, Web3.0, Metamask, React and IPFS** Mr. Roshan Singh Network Systems and Security Group, Ex-Open Source Intelligence Group IIT, Guwahati, India
12:30PM to 1:30PM	**Lunch Break**
1:30PM to 3:30PM	**Hands-on session on Developing decentralised applications (DApp) using Web3.0** Mr. RaajAnand Mishra UI/UX Engineering Lead, Dell Technologies, Bangalore, India
Day-4 (Friday, 04th November, 2022)	
9:00AM to 11:00 AM	**Hands-on Session - Hyperledger Fabric Architecture I** Mr. Tharaka Mawanane Hewa CWC-Networks and Systems University of Oulu, Finland
11:00AM to 11:30AM	**Break**
11:30 to 12:30PM	**Solidity and Smart contract, AI integration with Blockchain** Mr. Maharaj Brahma Department of CSE, Indian Institute of Technology (IIT), Hyderabad, India
12:30PM to 1:30PM	**Lunch Break**
1:30PM to 3:30PM	Hands-on Session - Hyperledger Fabric Architecture II Mr. Pankaj Shukla Additional Director, NIELIT, Guwahati, India
Day-5 (Saturday, 05th November, 2022)	

9:00AM to 11:00 AM	**India's Initiatives on Leveraging Blockchain Technology** Dr. Rakesh Tripathi Associate Professor, Department of IT, National Institute of Technology (NIT), Raipur, India.
11:00AM to 11:30AM	**Break**
11:30 to 12:30PM	**Convergence of Blockchain and AI** **Dr. Randhir Kumar** Assistant Professor, Dept. of Computer Science and Engineering, SRM University, AP, India
12:30PM to 1:30PM	**Lunch Break**
1:30PM to 3:30PM	**Future Research Directions For Blockchain Technology and Valedictory** Dr. Pranav Kr. Singh & Dr. Anshuman Kalla

Chhotubhai Gopalbhai Patel Institute of Technology (CGPIT), Uka Tarsadia University (UTU) and Central Institute of Technology, Kokrajhar has jointly organized Five-Day online STTP on "**BLOCKCHAIN TECHNOLOGY AND ITS EMERGING APPLICATIONS**". The STTP was conducted from 4th to 8th July, 2022. Total 85 participants from Diploma, Degree and M. Tech from Computer and Information Technology has actively participated in the STTP.

Day-1

Session-1

The first session of the day-1 was delivered by **Dr. Pradeep Kumar, Assistant Professor, Swansea University, United Kingdom (UK).** He addressed various cryptographic primitives which is an important pillar to understand blockchain. The cryptographic concepts like Symmetric and Asymmetric/ Public key Cryptography, Stream Cipher, Massage Authentication Code (MAC), Advanced Encryption Standards (AES) were being covered during the session.

Session-2

The Session II was conducted by **Dr. Mayank Aggrawal Professor and Head, Gurukul Kangri University, Haridwar.** During this interactive session, Dr Mayank initiated with real world example relating with blockchain basics. He also explained the origin of blockchain technology and its later evolutions.

Session-3

Dr. Mayank Aggrawal continued the third session. In this informative session, he thoroughly explained the architecture of blockchain. The working of blockchain was effectively explained which covered many important concepts like consensus protocol, Proof of work protocol, role of miners etc. He also narrated various tradeoffs while using blockchain technology.

Day-2

Session-4

The first session of the day-2 was delivered by **Mr. Raaj Anand Mishra, UI/UX Engineering Lead, Dell Technologies, Bangalore.** In this interactive session, Mr. Raaj started with introduction of Ethereum and features of Ethereum. He also explained how to implement decentralized applications using Smart contracts with the help of Ethereum platform. This

hands-on session was very fruitful in terms of understanding and implementation of various practical approaches of Smart contracts.

Session-5

The Session II was conducted by **Dr. Mayank Aggrawal Professor and Head, Gurukul Kangri University, Haridwar.** In continuation with session I, Dr Mayank initiated with Smart Contracts and Its Application Towards Dapps. He further demonstrate development decentralized applications by writing Smart Contracts.

Session-6

The third session was delivered by **Dr. Sandip Chakraborty Associate Professor Department of Computer Science and Engineering IIT Kharagpur.** In this informative session, he thoroughly explained the concept of Consensus Mechanisms used in Blockchain. He further highlighted different types of consensus, its characteristics and the need of consensus. He also narrated consensus in Bitcoin network.

Day-3

Session-7

The first session of the day-3 was delivered by **Mr. Raaj Anand Mishra, UI/UX Engineering Lead, Dell Technologies, Bangalore.** In this interactive session, in continuation with his previous talk, Mr. Raaj explained how to implement decentralized applications using Web 3.0. This hands-on session was very fruitful in terms of understanding and implementation of various practical approaches of developing decentralized applications (DApp).

Session-8

The Session II was conducted by **Mr. Roshan Singh Network Systems and Security Group, Ex-Open Source Intelligence Group IIT, Guwahati.** In continuation with previous

session I, Mr Roshan demonstrated various practical aspects which includes but not limited to DApp, Web3.0, Metamask, React and IPFS.

Session-9

The third session was delivered by **Dr. Sudeep Tanwar Professor and Senior IEEE Member**, **Department of Computer Science and Engineering, Institute of Technology, Nirma University.** During his session, **Dr. Sudeep** thoroughly explained the concept of Distributed Ledger Technologies (DLT), Its Types, and Blockchain Evolution (1.0 to 4.0).

Day-4

Session-10

The first session of the day-4 was delivered by **Mr. Tharaka Mawanane Hewa CWC-Networksand Systems University of Oulu, Finland.** He covered many important concepts of Hyperledger Technology like Hyperledger overview, elements of Hyperledger and its architecture. With hands on, he demonstrated configuration and implementation of Hyperledger.

Session-11

The Session II was conducted by **Mr. Maharaj Brahma Department of CSE, Indian Institute of Technology (IIT), Hyderabad, India.** He covered the topics: Solidity and Smart contract, AI integration with Blockchain.

Session-12

The third session was delivered by **Mr. Pankaj Shukla Additional Director, NIELIT, Guwahati, India,** explained the concept Hands-on Session - Hyperledger Fabric Architecture II.

Day-5

Session-13

The first session of the day-4 was delivered by **Mr. Tharaka Mawanane Hewa CWC-Networksand Systems University of Oulu, Finland.** He covered the concepts on India's Initiatives on Leveraging Blockchain Technology. He also narrated detailed explanation on application of blockchain using bitcoin. Further he briefed on the adoption of blockchain applications in india as well as its challenges.

Session-14

The Session II was conducted by **Dr. Ajay Pratap Assistant Professor Department of Computer Science and Engineering, Indian Institute ofTechnolgy (IIT BHU).**He covered the topics: Application of Blockchain in Smart Healthcare in which he explained how we can optimize healthcare system while using blockchain.

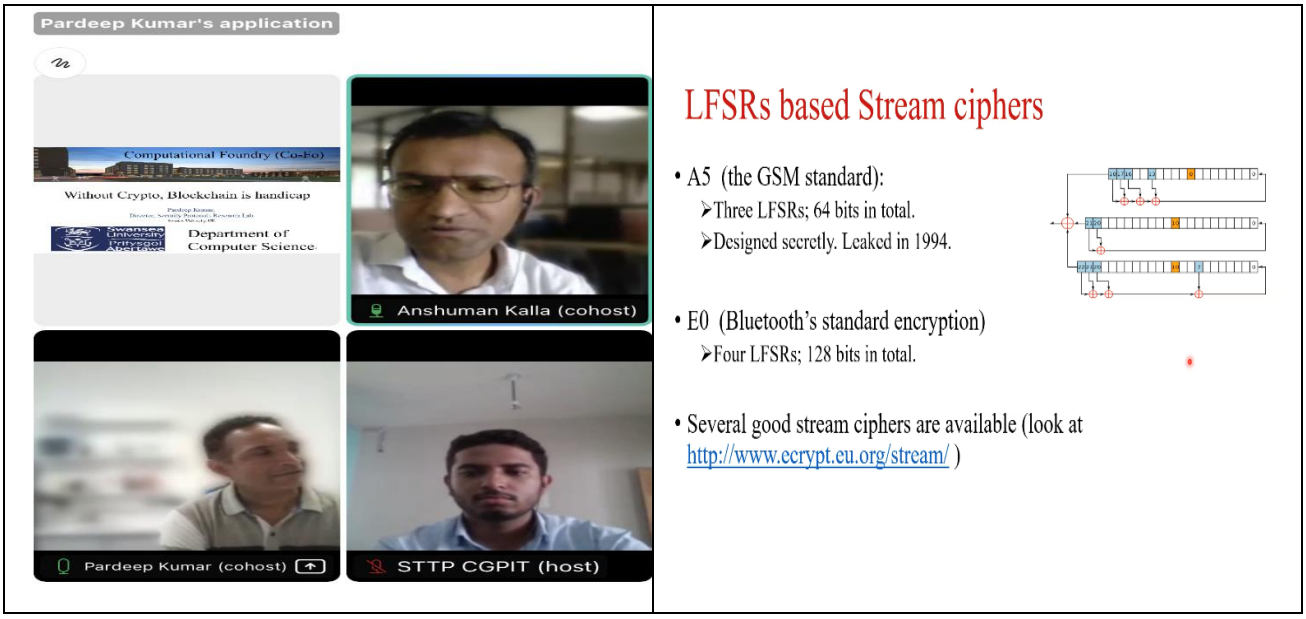
Session-15

The third session was delivered by **Dr. Pranav Kr. Singh & Dr. Anshuman Kalla** on Future Research Directions. They explored various aspects of research in the domain of blockchain for Blockchain Technology. They also narrated he use of Blockchain along will ensure trust, security, and transparency in decentralized power system applications.

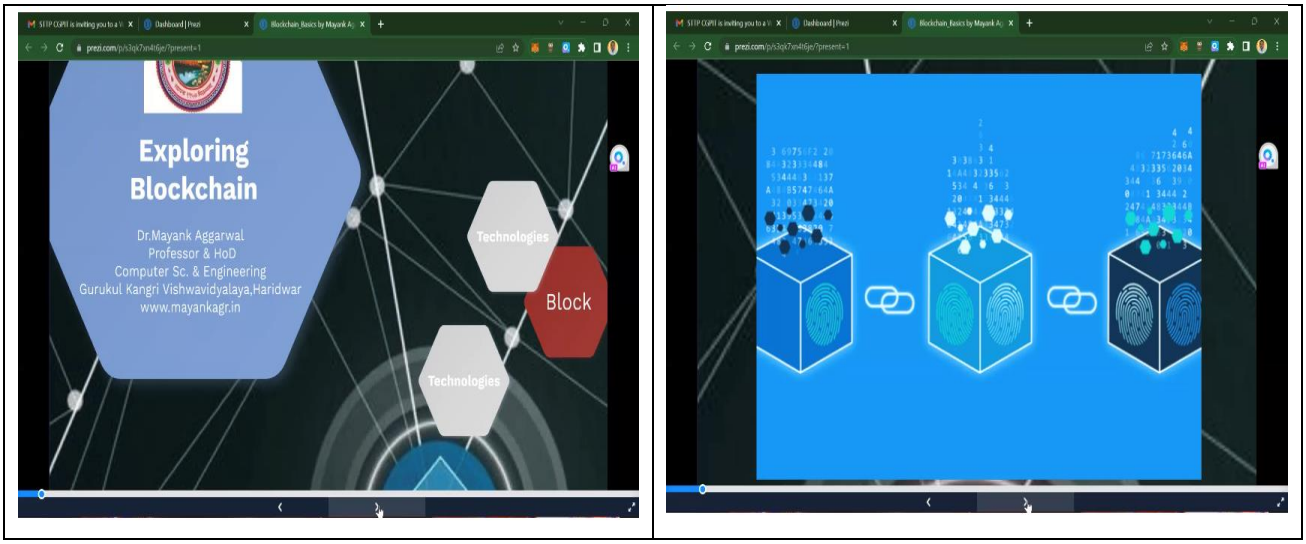
Valedictory:

In this session the convener Dr. Anshuman Kalla gave the observations made during the STTP 2.0. He also gave the overall remarks on the program. There are total more than 100 registrations received from the faculty, research scholars and working Engineers all over India. During the valedictory session few participants give their feedback on the program. Dr. Anshuman conveyed his thanks to all the participants for their active participation in the STTP. He also expressed his gratitude towards the members of various committees for their efforts and dedications.

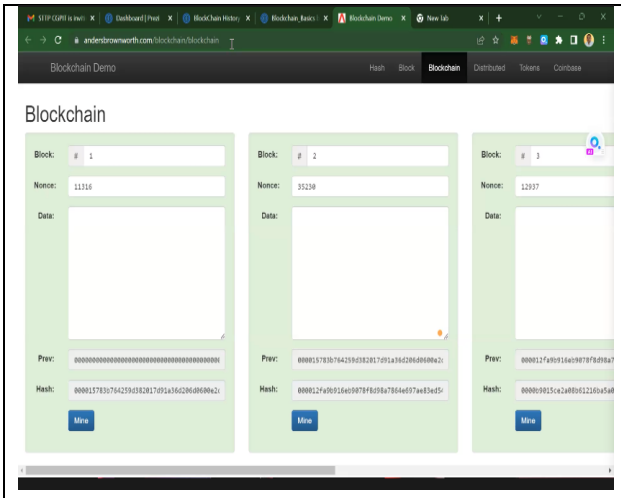
Day-1

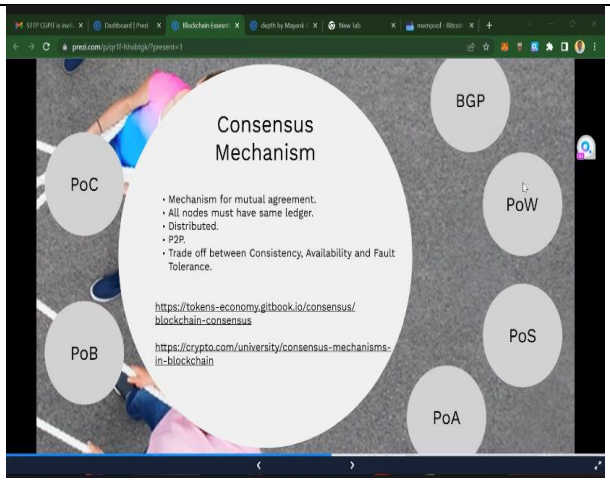


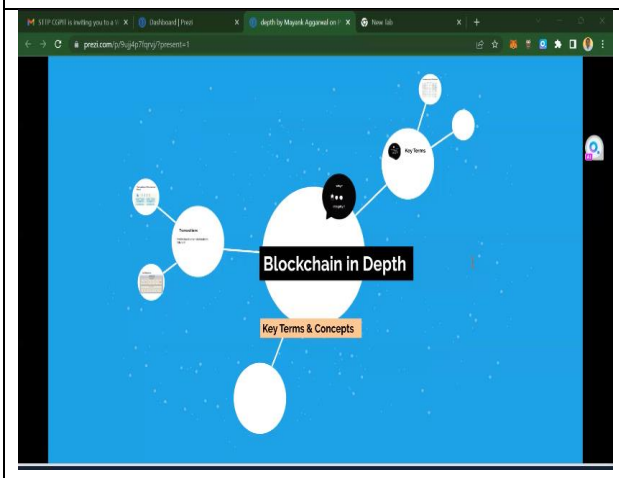
Knowledge shared by Dr. Pradeep Kumar



Dr. Pradeep Kumar exaplained about Blocks

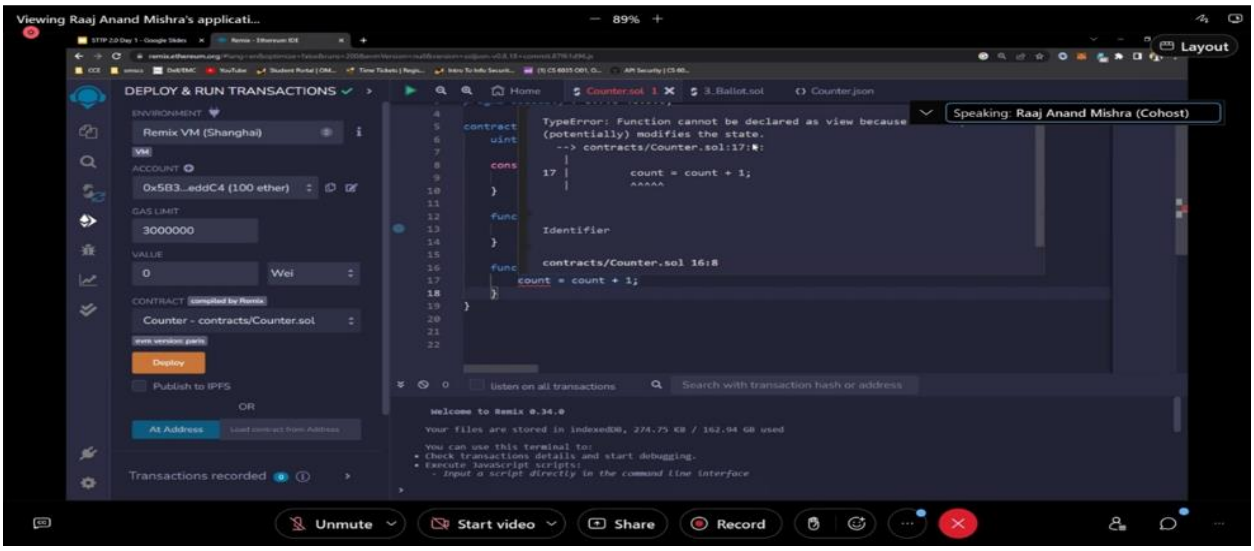




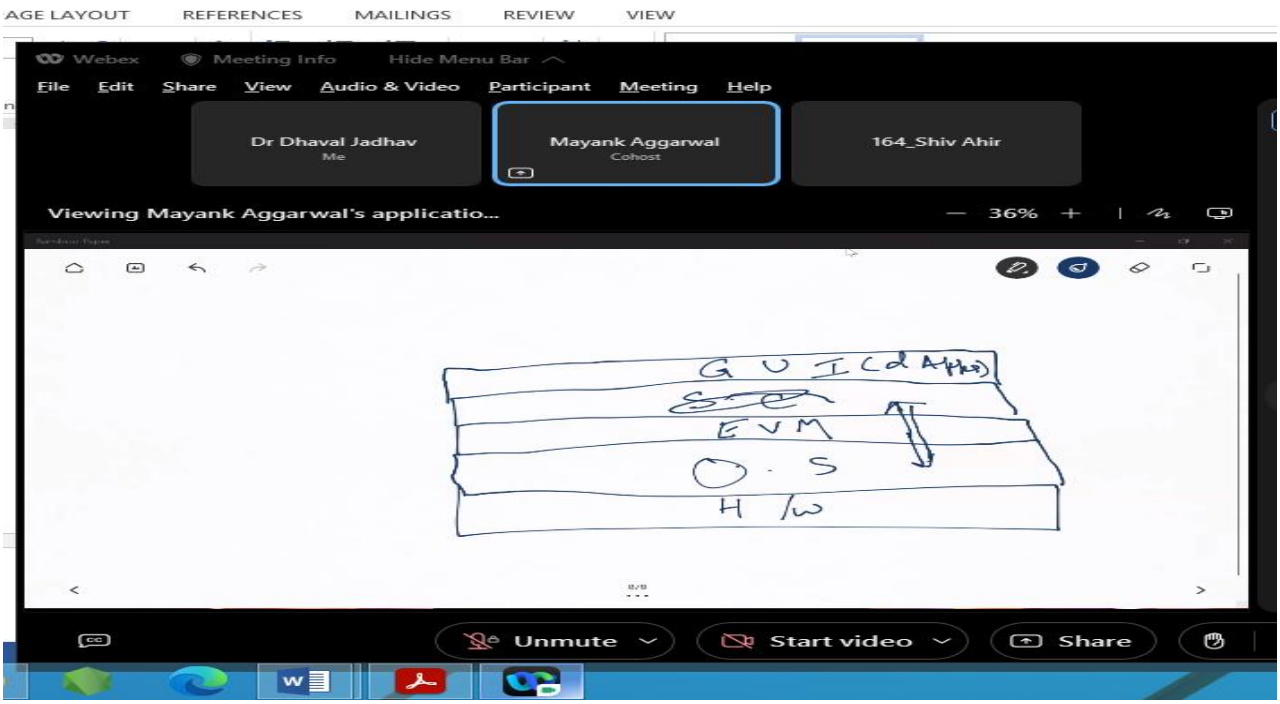


Dr. Mayank Aggarwal exaplained about Blocks in depth

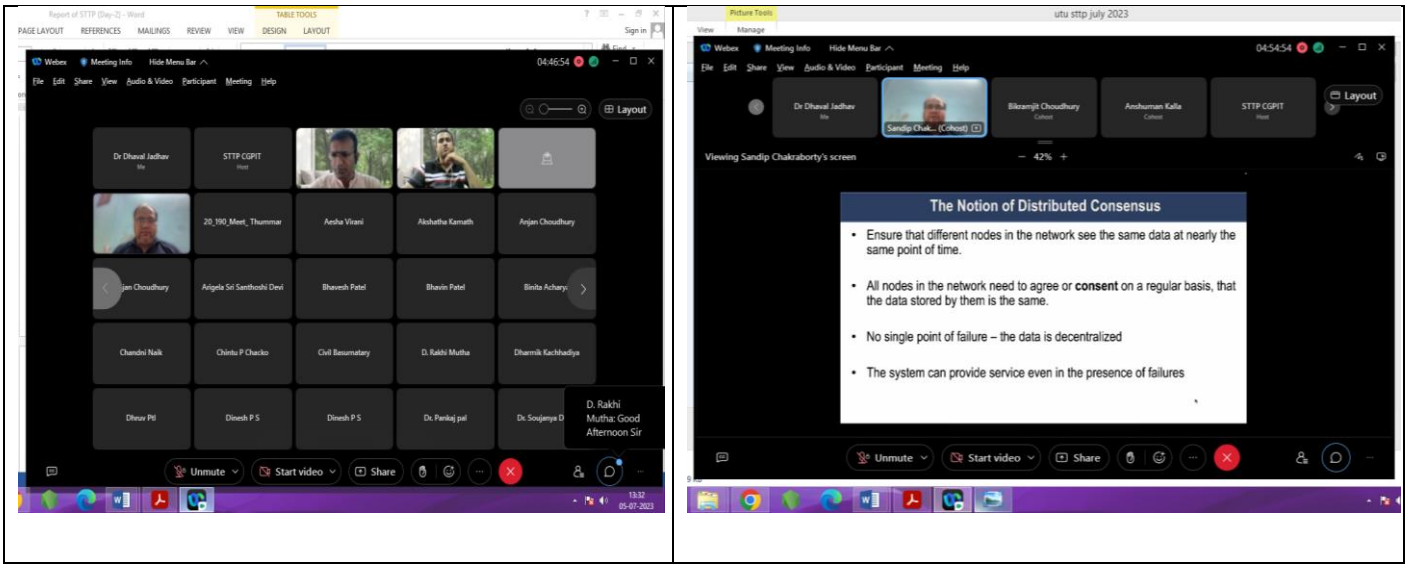
Day 2



Hands on session conducted by Mr. Raaj Anand Mishra

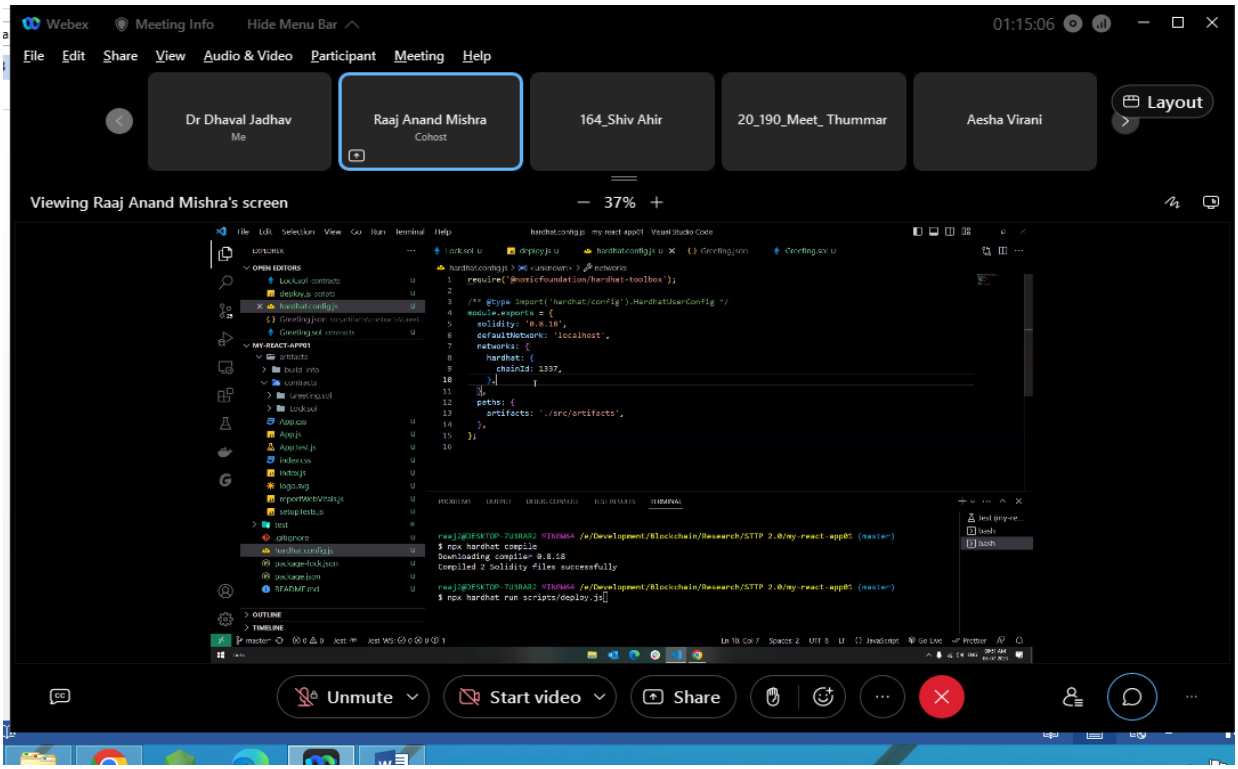


Operating system structure explained by Dr. Mayank Aggarwal

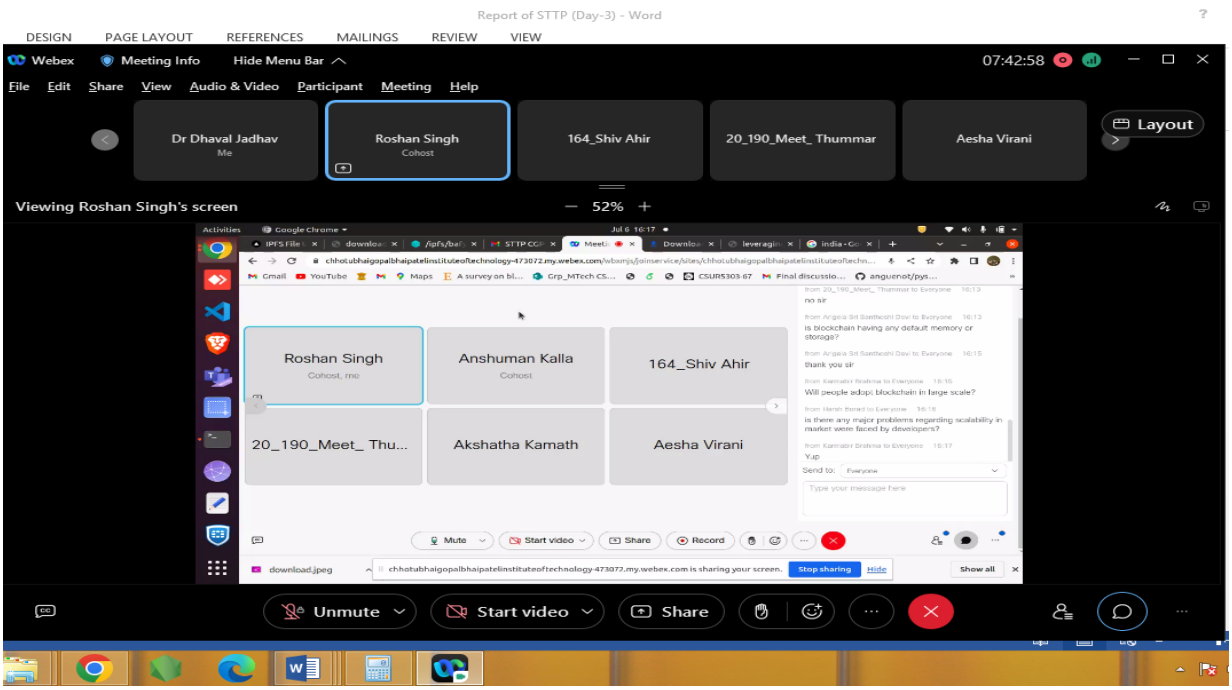


Consesus Mechanism on Blockchain discussed by Dr. Sandip Chakraborty

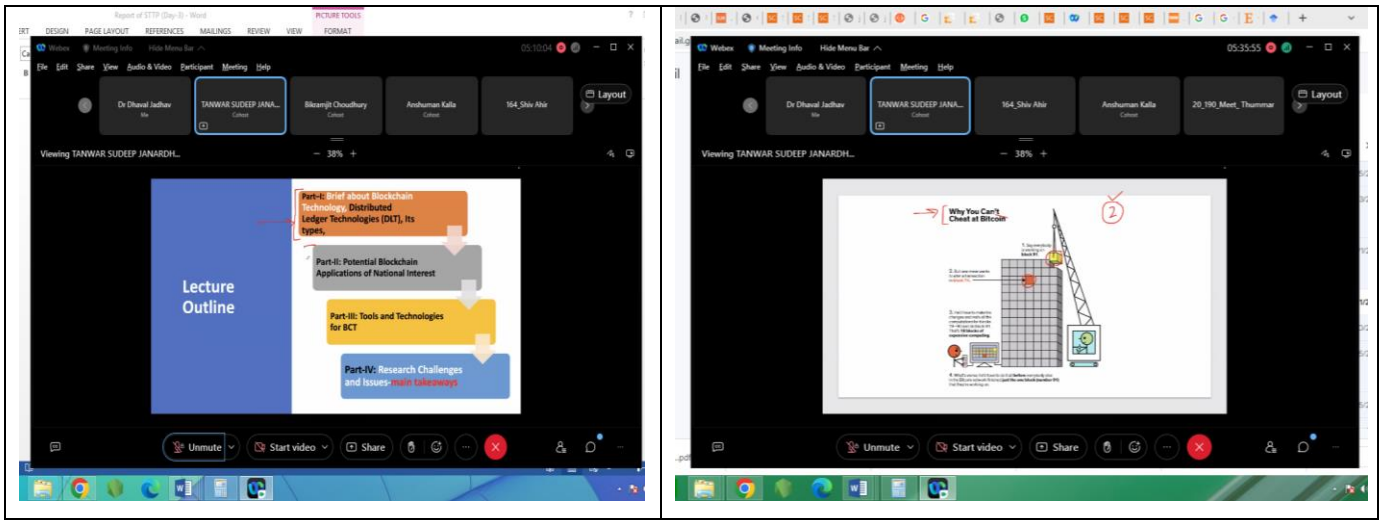
Day-3



Mr. Raaj Anand Mishra showed the mechanism of DApp

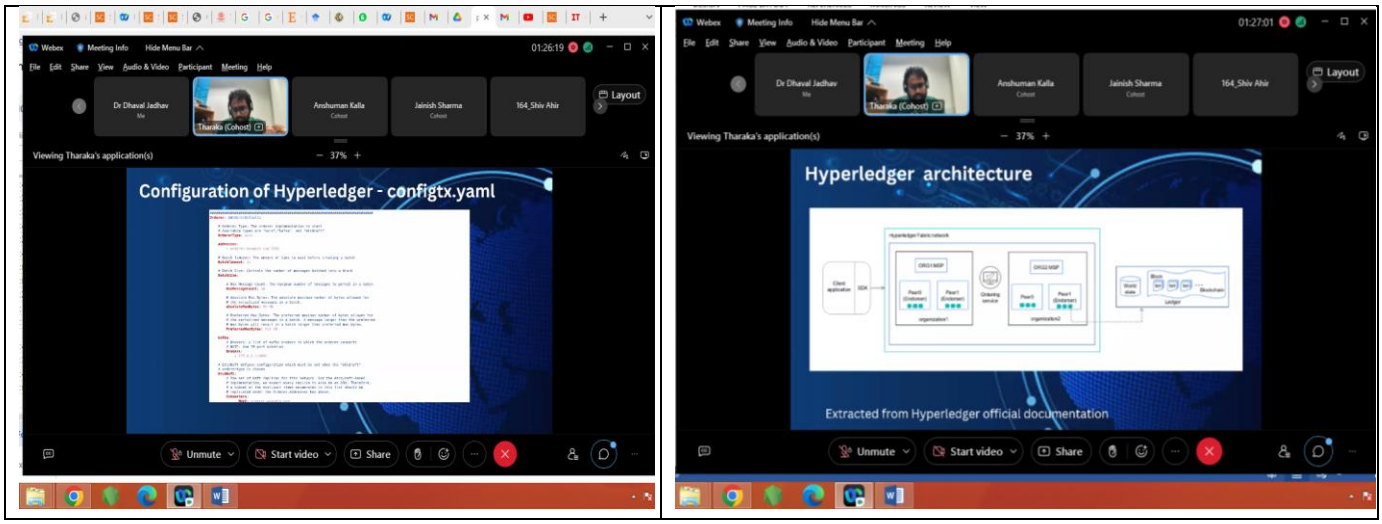


Mr. Roshan Singh discussed Metamask and IPFS

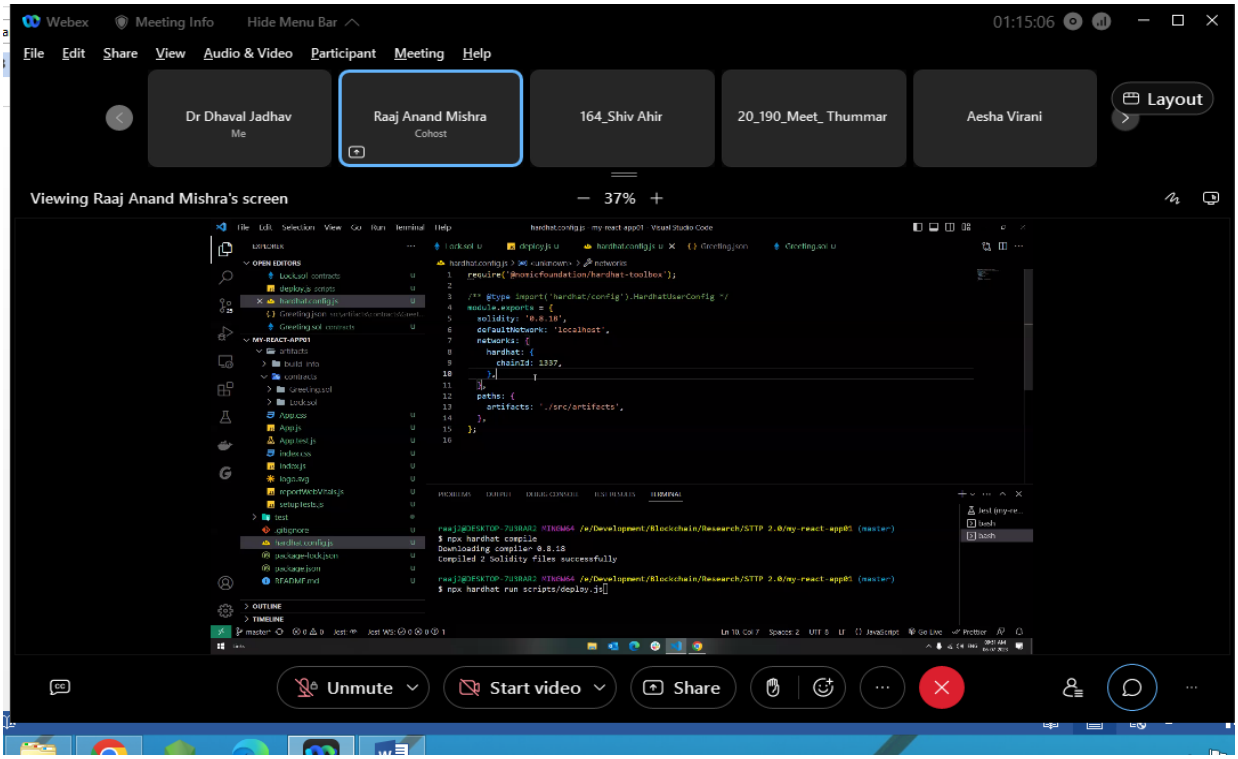


Dr. Sudeep Tanwar explained the DLT process

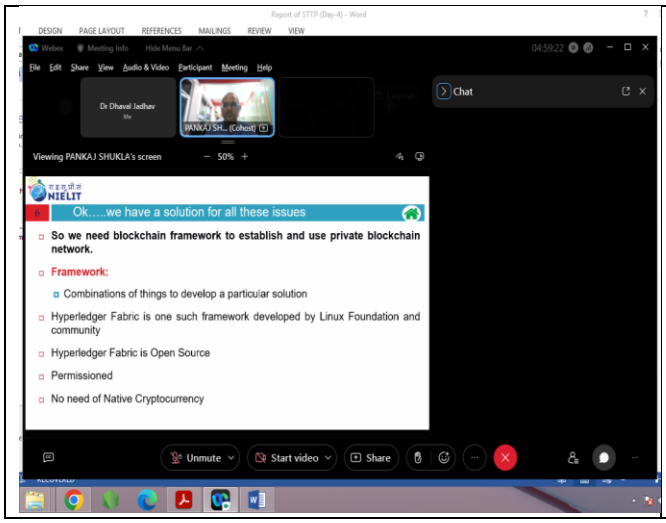
Day-4

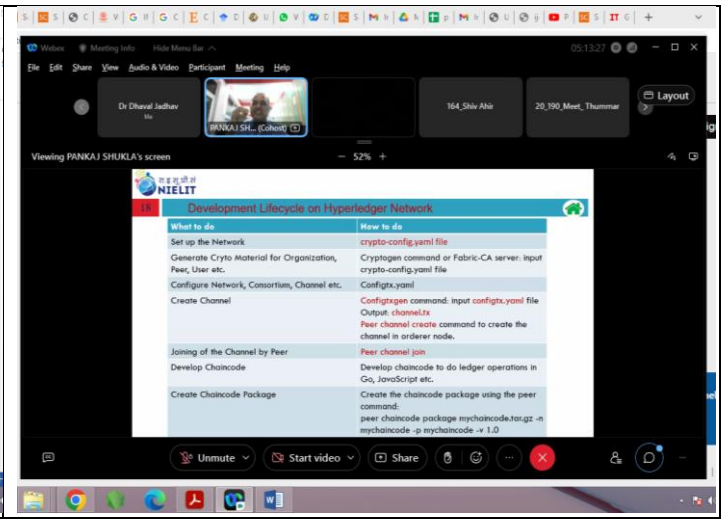


Hands on session – Hyperledger Fabric Architecture- I explained by Mr. Tharaka Hewa



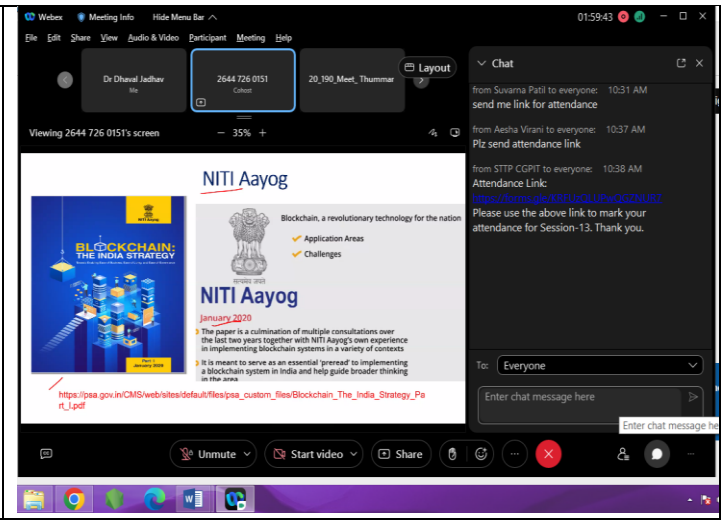
Mr. Raaj Anand Mishra explained the consesus mechanism



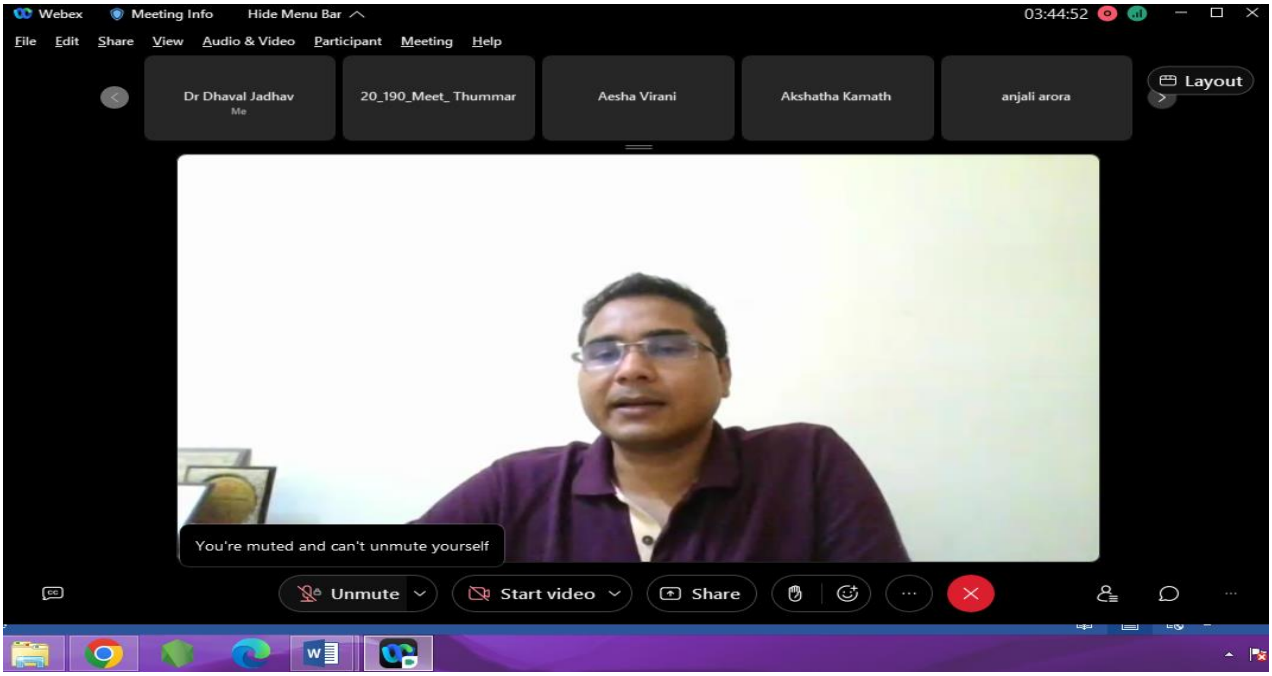


Mr. Pankaj Shukla explained Hyperledger Fabric Architecture-II

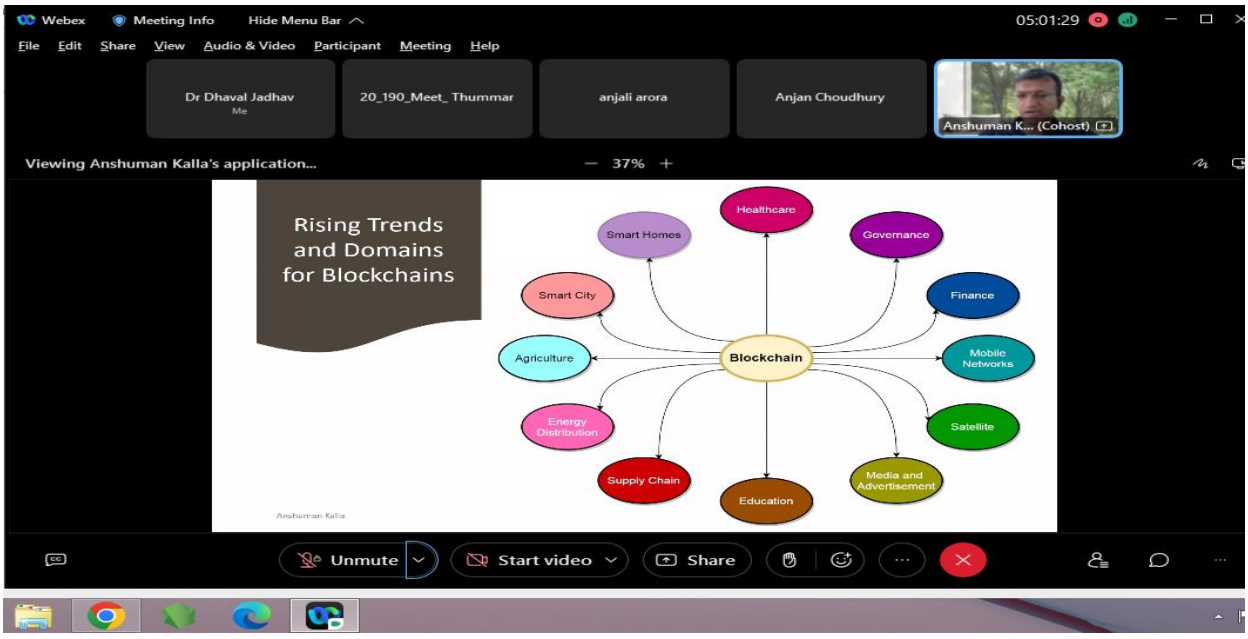
Day-5



Dr. Rakesh Tripathi exaplained about Blockchain applications



Dr. Ajay Pratap discussed about application of Blockchain in Smart Healthcare



Dr. Anshuman Kalla discussed the rising trends of Blockchains