



Department of

Electronics and Communication Engineering



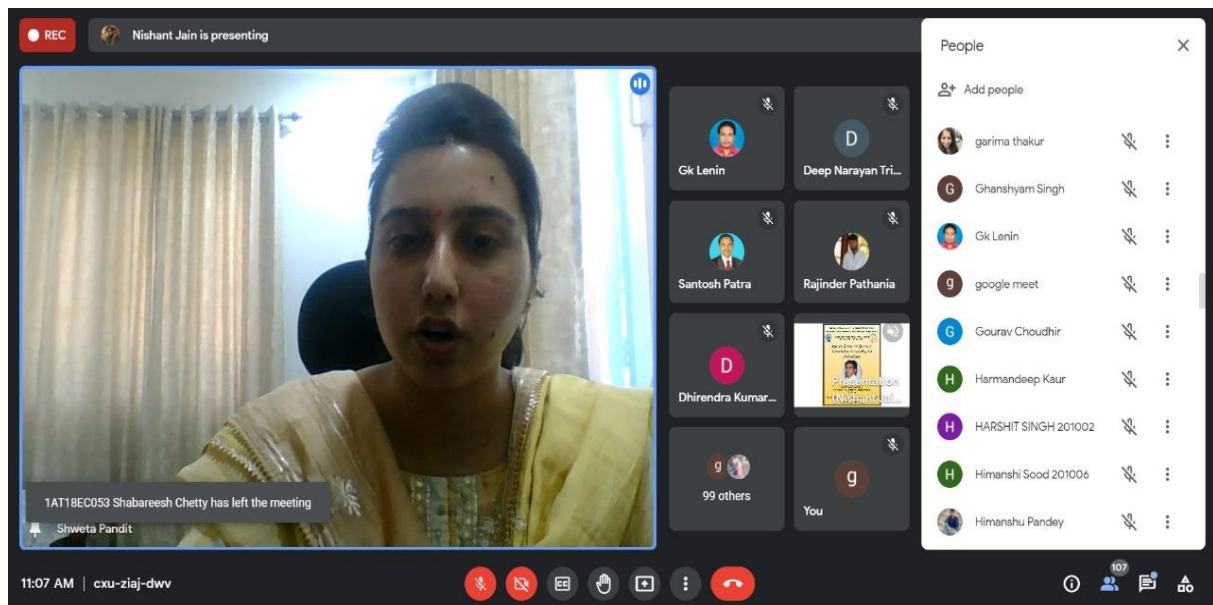
Jaypee University of Information Technology Waknaghat

Event Report: Session-1

3rd July, 2021

Department of Electronics and Communication Engineering, JUIT Waknaghat is organizing an online workshop on **Industrial Revolution 4.0**, during 3rd July to 4th September, 2021, where the first session was conducted on 3rd July from 11:00 AM – 01:00 PM.

In an effort to inspire and help the participants exploring the new dimension for research and the academic activities, **Dr Shweta Pandit, Assistant Professor, Department of Electronics and Communication Engineering** welcomed the gathering and introduced the first session speaker, **Prof Ghanshyam Singh, University of Johannesburg, South Africa**. She also highlighted the importance of the workshop and motivated the participants. She told how **Industry 4.0 ‘The Fourth Industrial Revolution’** helps smart factories where cyber-physical systems can monitor the physical processes of the production and make decentralized decisions in real time, which includes technologies like artificial intelligence, robotics, internet of things, 3D printing, genetic engineering, quantum computing and many others.



REC Nishant Jain is presenting

Jaypee University of Information Technology
Department of Electronics & Communication Engineering

Workshop on Industrial Revolution 4.0
(3rd July 2021 - 4th Sep 2021)

Keynote Speaker for Session 1:
Introduction to Industry 4.0 Technologies

Prof. Ghanshyam Singh
Professor, University of Johannesburg,
S. Africa

Date: 3rd July, 2021, Time: 11:00 - 13:00 IST
Medium: GoogleMeet

11:10 AM | cxu-ziaj-dwv

People

- Add people
- Dr. Priyanka Mishra
- Dr. Sasanko Sekhar Ganta...
- Dr. V. K. Singh
- Dr.Renuka Bhandari
- Ekal Sharma 201016
- Er Shubham Patiyal
- Er. Kapil Mehta
- garima thakur
- Ghanshyam Singh

107 others

The guest speaker, **Prof Ghanshyam Singh**, highlighted the **Industry 4.0** concept to participants and presented examples of solutions that are altering the manufacturing industry. He gave an overview of recent trends in **Industrial Revolution 4.0 and Revolution 5.0**, global trends of wireless connectivity, **4G, 5G and 6G Communication Systems and IoT Industry Applications**.

REC 6 Ghanshyam Singh is presenting

✓ Next Generation Industrial Revolution

Industry 5.0: A step towards — Sustainable, human-centric and resilient.

University of Johannesburg, S Africa

7/3/2021

11:30 AM | cxu-ziaj-dwv

Shweta Pandit

Ghanshyam Singh

Deep Narayan Trip...

Dhirendra Kumar ...

Bahadur Singh

Rajiv Kumar

Sampath Kumar V

109 others

You

REC 6 Ghanshyam Singh is presenting

1760 Industry 1.0
Mechanization water & steam power

1870 Industry 2.0
Mass production, electricity

1969 Industry 3.0
Computers, automation, robotics

2000 Industry 4.0
Internet, data analytics, connectivity

2020 Industry 5.0
Mass customization

1st IR, was really a revolution, to invention of steam machines, the usage of water and steam power and all sorts of other machines, would lead to the industrial transformation of society with trains, mechanization of manufacturing and loads of smog.

2nd IR is typically seen as the period where electricity and new manufacturing 'inventions' which it enabled, such as the assembly line, led to the area of mass production and to some extent to automation.

3rd IR had everything to do with the rise of computers, computer networks, the rise of robotics in manufacturing, connectivity and obviously the birth of the Internet, that big game changer.

4th IR we move from 'just' the Internet and the client-server model to ubiquitous mobility, the bridging of digital and physical environments (in manufacturing referred to as Cyber Physical Systems).

<https://nickelinstute.org/blog/2020/november/customising-the-future-the-next-industrial-revolution/>
University of Johannesburg, S Africa 7/3/2021

11:32 | cxu-ziaj-dwv

The speaker explained that the **Smart Factory** is an intelligent production system which utilizes the integration of manufacturing services. The main issues of key technologies involved in the **Physical Layer, The Network Layer, and The Data Applications Layer in Smart Factory** are needed to analyse with use cases as the big advances and data based virtual manufactures mode will improve product quality, increase production efficiency and reduce energy production. It was then concluded that the intelligent manufacturing based on big data will lead to **Revolution of Traditional Industry**.

REC 6 Ghanshyam Singh is presenting

INDUSTRY 4.0

- Focus on connecting machines
- Mass customization
- Intelligent Supply Chain
- Smart products
- Manpower distanced from factories

INDUSTRY 5.0

- Focus on delivering customer experience
- Hyper customization
- Responsive & Distributed supply chain
- Experience Activated (Interactive) Products
- Return of Manpower to factories

<https://ww2.frost.com/frost-perspectives/industry-5-0-bringing-empowered-humans-back-to-the-shop-floor/>
University of Johannesburg, S Africa 7/3/2021

12:13 PM | cxu-ziaj-dwv

REC G Ghanshyam Singh is presenting

The variations of sum throughput with the SNR at CU-1 for CR-OMA, CR-NOMA, CR-MIMO, and MIMO-CR-NOMA for $N_T = N_R = 8$. 7/3/2021

SNR at CU-1 (dB)	CR-OMA (bps/Hz)	CR-NOMA (bps/Hz)	CR-MIMO (bps/Hz)	CR-NOMA-MIMO (bps/Hz)
0	~2	~2	~5	~8
1	~2.5	~2.5	~6	~10
2	~3	~3	~7	~12
3	~3.5	~3.5	~8	~14
4	~4	~4	~9	~16
5	~4.5	~4.5	~10	~18
6	~5	~5	~11	~20
7	~5.5	~5.5	~12	~22
8	~6	~6	~13	~24
9	~6.5	~6.5	~14	~26
10	~7	~7	~15	~28

12:56 | cxu-ziaj-dwv

REC G Ghanshyam Singh is presenting

Latency and Reliability Requirements

1) METRO 1
2) A. Frotscher et al., Requirements and current solutions of wireless communication in industrial automation, ICC 2014

University of Johannesburg, S Africa 7/3/2021

Application	Reliability	Latency	Key Requirements
eHealth (body sensors)	High	High	Relaxed Latency needs, High reliability requirements, Specialty: Long battery lifetime required
Smart Grid	Low to High	High	Moderate to high latency and reliability requirements, Specialty: Large distances to be covered
Automotive	High	High	E2E latency < 5-10 ms ¹⁾ , Reliability up to BLER 10 ⁻⁵ , Specialty: Mobility, Positioning accuracy 0.5m
Augmented Reality	Low to High	High	E2E latency < 10 ms to avoid cyber sickness, Reliability requirements less tough (but need to detect failures reliably), Specialty: High data rates
Remote robotics / surgery	High	Low	E2E latency < 1 ms due to need for haptic feedback, Reliability up to BLER 10 ⁻⁴
Industry Automation	High	Low	E2E latency partially < 0.5 ms, Reliability up to BLER 10 ⁻⁶ - ³⁾ , Specialty: Often isolated areas

12:29 | cxu-ziaj-dwv

At the end of the session, queries of the participants were answered and feedback collected from participants. The session was well appreciated by the participants.