Gandhinagar Institute of Technology

A Report on
"Innovation in Robotics & Automation
and Its Application"
Sponsored by GUJCOST and DST
(4th - 5th December 2020)

Objective:
The program will provide a valued platform for the industry specialists and academicians from institutes to understand exchange and explore the new developments in field of Robotics and its kinematics and dynamics that makes the faster adoption of Robots as per recent global trend.

About Webinar:
This webinar will be discussing the innovation in robotics technology with the development of new trends. It is also aimed to understand the robot kinematics and dynamics, artificial intelligence and machine learning. It explains how this technology helping in various sectors like health care, agriculture, automobile, defense, smart home security and surveillance. So, the basic technology of robotics of various application field will be studied in detail. Major thrust area targeted:

- Introduction to Robotics technology
- Kinematics and Dynamics of Robot
- Industrial revolution with Robotics
- AI in Robotics
- Vision system in Industrial robotics.
- Robot for material handling application
- Future of Robots in India

About the Institute
Gandhinagar Institute of Technology has been established by Platinum Foundation in 2006. The Institute is affiliated to Gujarat Technological University and approved by AICTE New Delhi. The Institute aims to be a leading center for research and engineering study, pursuing knowledge in both fundamental and applied area, and collaborating closely with business and industry in promoting technological innovation and economic development. It offers bachelors Program in ME/CE/IT/EC/EE/CL. It also offers M.E. in Mechanical Engineering with specialization in Thermal Engineering and CAD / CAM and M.E. in Software Engineering in Computer Engineering. It also offers MBA Program with specialization in Marketing, Finance, Human Resource and Information Technology. It runs active local chapter of NPTEL, IIT Madras, ISHRAE, SAE, 4 stars rated Open Source Technology Club, Mobile and Wireless Technology Club. GIT always strive to focus on real time dynamic problems for projects and laboratory work and as a result recently our students team performed well and won a smart India Hackathon at IIT Kanpur, a MHRD, Govt. of India initiation.

Day-1 (04/11/2020)
Inauguration
Time: 09:15 am to 03:15 pm

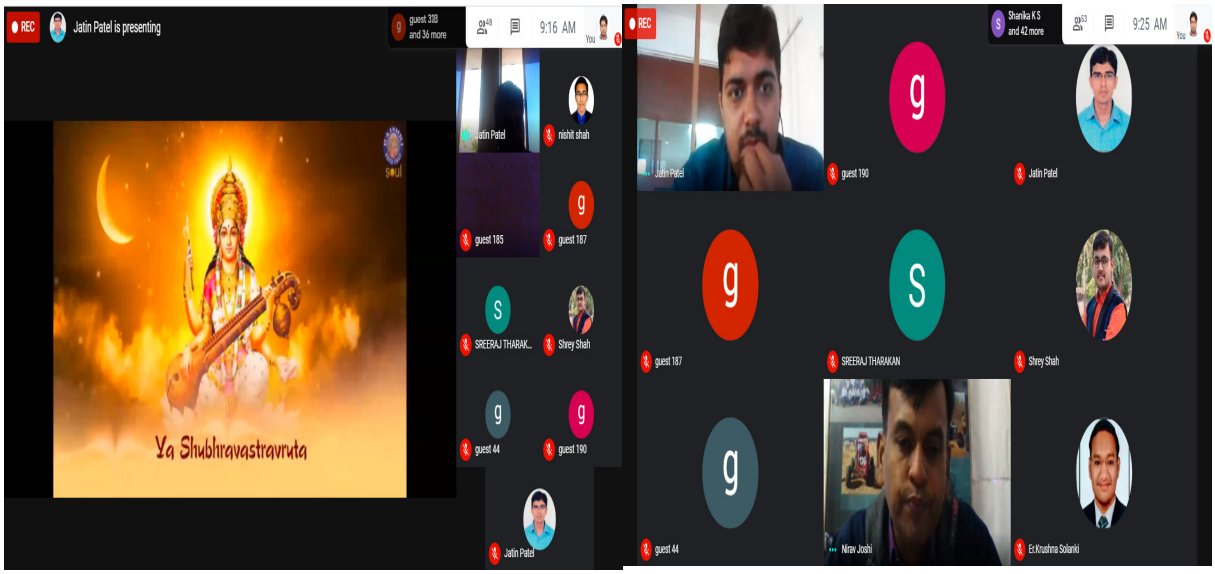
The Webinar started with a prayer to goddess Saraswati followed by the Inaugural Speech by Prof Jatin M Patel, Assistant Professor, Gandhinagar Institute of Technology also the coordinator of this event. He welcomed all the dignitaries & participants of the first day.

After that, Dr. H N Shah, Director, Gandhinagar Institute of Technology had addressed the participants and discussed about the institute and his goal to conduct this type of events.

Prof. Nirav Joshi, HOD, Mechanical Engg Dept. Gandhinagar Institute of Technology, has

introduced varies activities carried out by the department to the participants. The coordinator of this event has given the closing remarks of inauguration function and the event has moved to its real objective.

On the first day different topics was covered like, “Introduction to Robotics and Automation, Industry 4.0 and Collaborative Robots in Manufacturing, Robotics2Rural, Robotics Arm Dynamics”. Questionaries’ sessions were also arranging for the participants after each presentation.

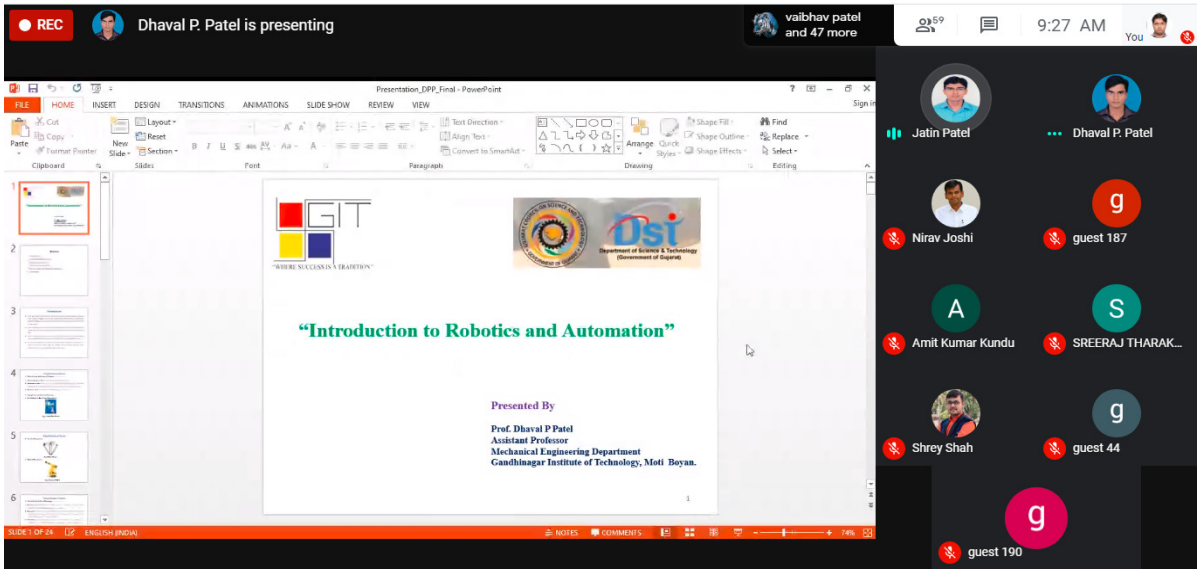


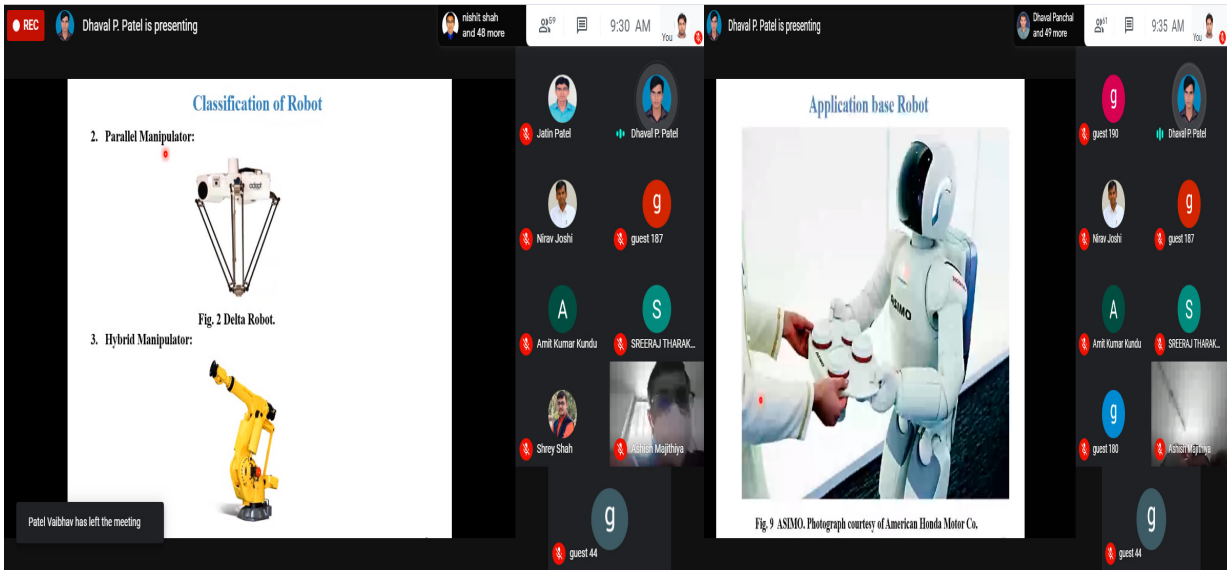
Speaker 1: Prof. Dhaval P Patel,

(**Assistant Professor, Mechanical Engineering Department, GIT**)

Time: 9:30 am to 10:00 am

Prof. Dhaval Patel has expertise in areas of Machine Design and Structural Analysis and has guided many students in field of robotics and automation projects.

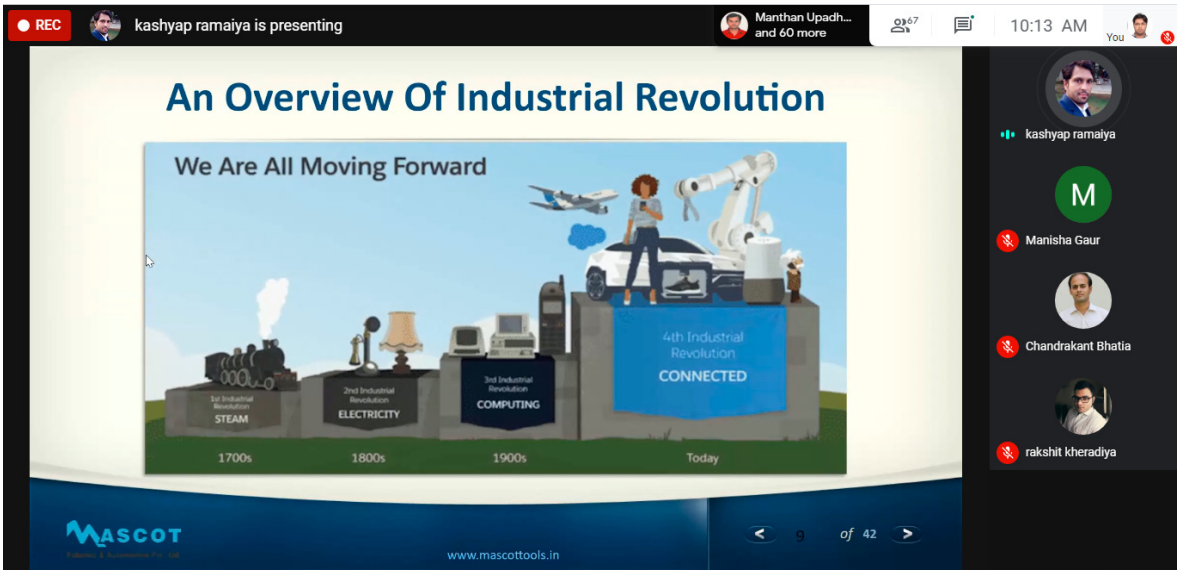


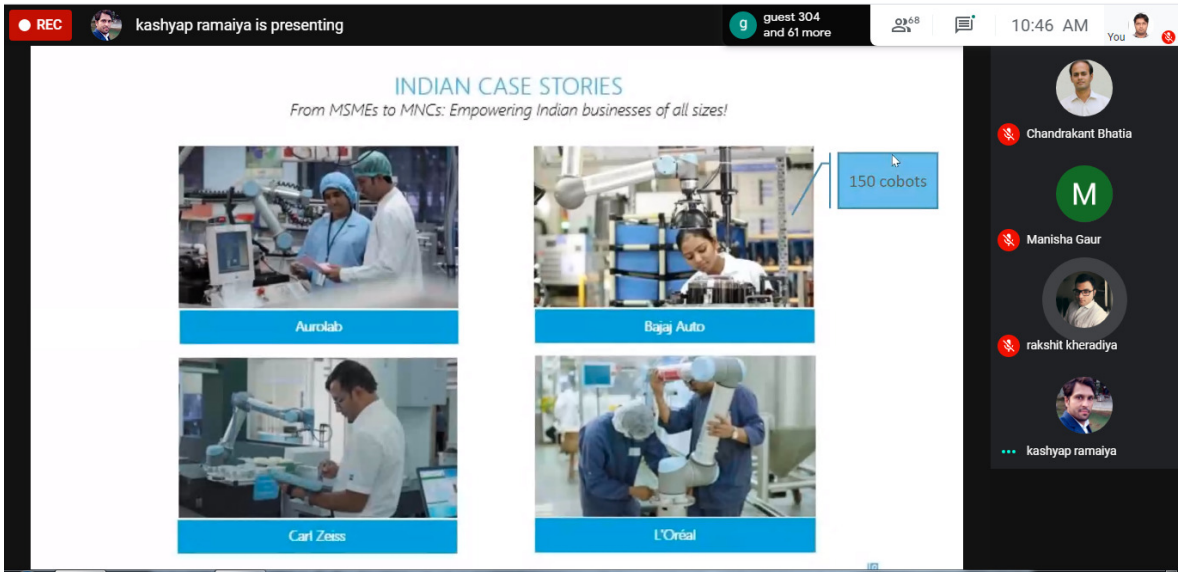


Prof. Dhaval P Patel covered the topic on "Introduction to Robotics and Automation." He has explained basics of robotics and its use in the field of automation. He has covered detailed classification of robot, application of robot, social humanoid robot, the recent trends in robotic research, etc. during his presentation. By attending the presentation, as a beginner one can have the thorough knowledge regarding all the aspects of robotics and its application. The presentation showed the recent advancement in different industries like food industries, Manufacturing industries, medical science equipment, etc. considering the use of robots with good videos. Participants were encouraged to work in the field of robotics.

Speaker 2: Mr. Kashyap K Ramaiya
(Business Development Head, Mascot Robotics & Automation)
Time: 10:00 am to 11:30 am

Mr. Kashyap K Ramaiya has expertise in Computer Integrated Manufacturing, Automation, Robotics & Mechatronics systems. They have developed "Robotic System for Magnetic Field Measurement of Plasma Vessel" for Plasma Research Institute. He has experience of conducting workshops on Arduino Controller & Guiding student projects.





Mr. Kashyap Ramaiya has covered the topic Industry 4.0 and Collaborative Robots in Manufacturing, which deals with its scope, application and future of manufacturing. In the presentation he has covered the application of COBOTS in the field of manufacturing, academic and medical aspect. The major focus of COBOTS in the presentation was manufacturing. In that he has shown some good quality videos of loading-unloading application using COBOTS for gear industries. That actually saves human effort, that can utilize in other effective work. With this the participants got the idea of working with COBOTS in industries as well as the resources and other requirements one needs to study while purchasing the COBOTS

Speaker 3: Dr S K Saha
(Professor IIT, Delhi and Vice President, The robotics society)
Time: 11:30 am to 12:30 pm

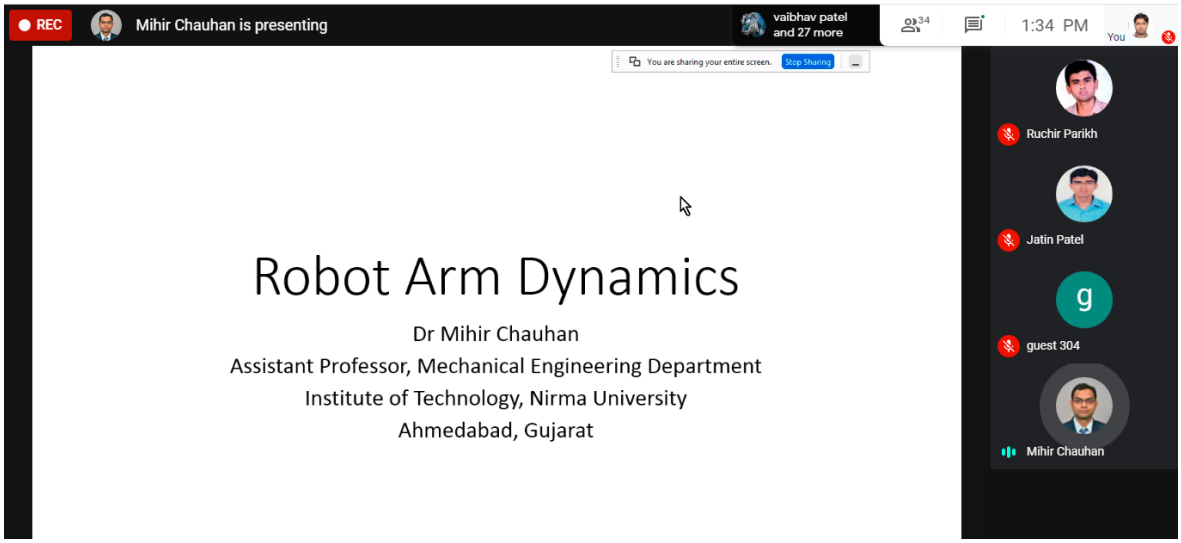
Prof. Subir Kumar Saha is well known professor from IIT Delhi, and he is Vice President (Academic) of The Robotics Society, India. Also, he is working in field of robotics to improve social life in rural area.

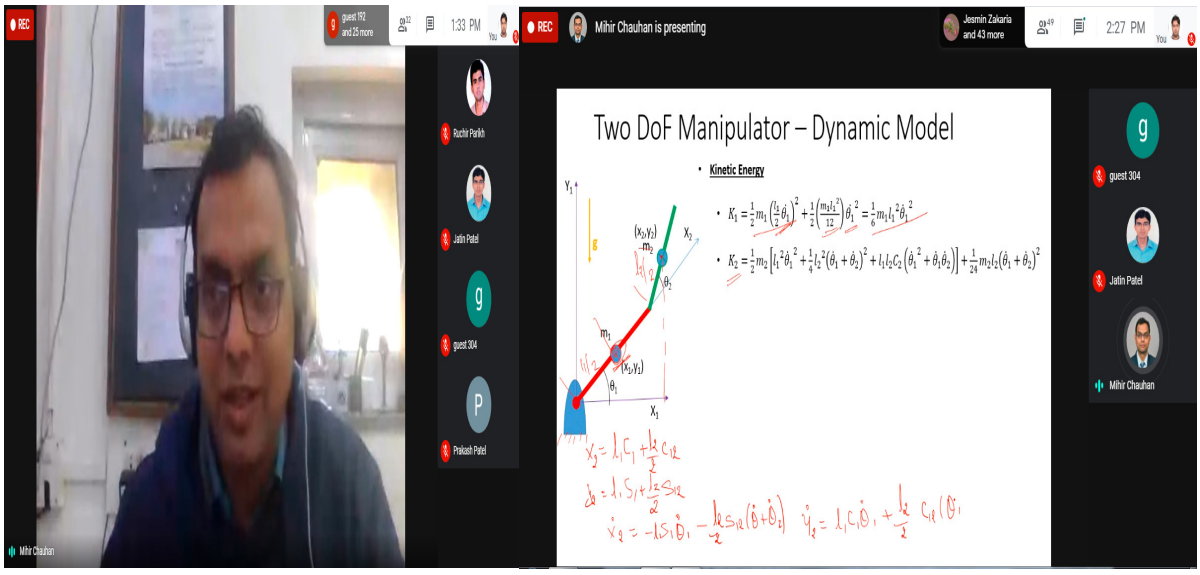
Dr. S K Saha has explained the topic "Robotics2Rural, Innovative Teaching and Research Approaches". In that presentation he has explained about RoCK-BEE (Robotics Competition based Education in Engineering) which deals with an innovative teaching and about MuDRA (Muliti Body Dynamics for rural application) which deals with an innovative research. The major focus of the

presentation was how the technology enhancement in the field of automation/robotics will help to improve the rural life of people. In this aspect he has showed variety of actual practice examples that justify the topic well. He has also explained other benefit to the society such as truck simulators, Tele-USG robots, mobile robots, defense robots.

Speaker 4: Dr Mihir Chauhan
(Assistant Professor, Mechanical Engineering Department, Institute of Technology, Nirma University)
Time: 1:30 pm to 3:00 pm

Dr Mihir Chauhan is working as Assistant Professor and faculty advisor of Team Robocon at Nirma University which has won the national championship for a record eight times and represented the country at the international ABU-ROBOCON event.



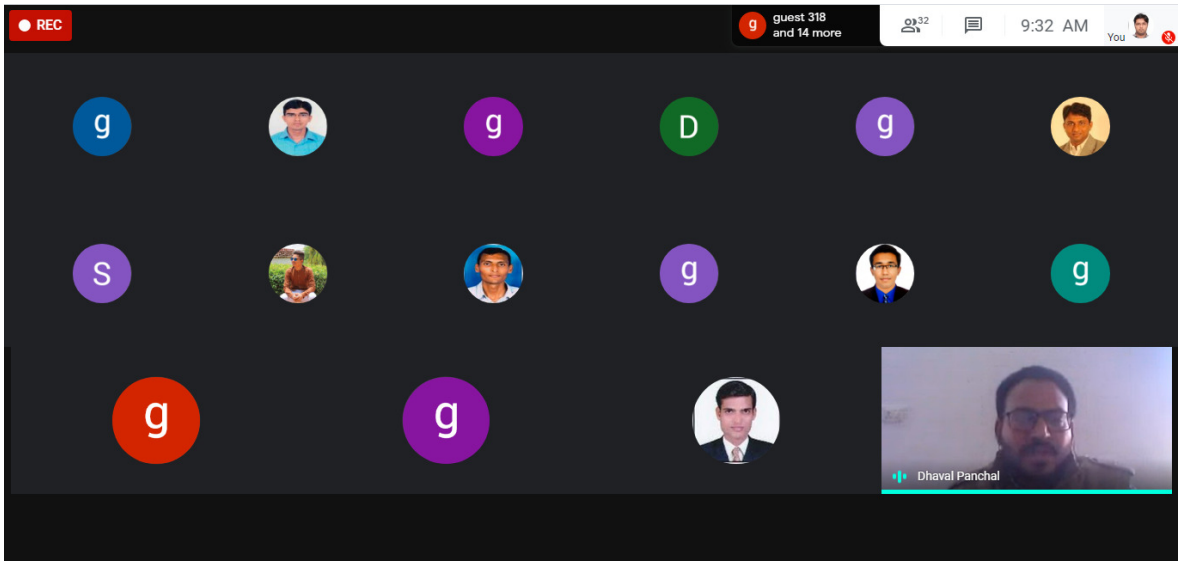


Dr Mihir Chauhan has explained the topic “Robotics Arm Dynamics”. He has presented the arm dynamics in detailed considering its practical application as well as the basic calculation/algorithm require to design such one. In this context he has gone through Dynamic equation of motion, Dynamic model of one DoF manipulator, Dynamics model of two DoF manipulator and general LE formulation algorithm. He has presented the event Robocon to justify the topic well. He has shared his past experience of various Robocon projects during the session. The Robocon 2021, which is being organized at China also being explained by him with animation video. The participants had a good experience about how one can start preparing for such events.

Day - 2 (05/12/2020)

Time (09:30 am to 3:15 pm)

The second day of webinar commenced by speech of Prof. Dhaval H Panchal, Assistant Professor, Gandhinagar Institute of Technology. He welcomed all the experts and briefly introduced them. On second day different topics were covered like AI in Robotics and Its application, Human-Robot Collaboration, Design and Control of Multimodal robots for industrial and field applications, Vision system used in Industry for Robotics & automation, Multi axis robot for material handling application. Feedbacks and Questionaries' sessions were also shared with the participants. At last Prof. Nirav Joshi, Head of Mechanical, has given the vote of thanks to all the experts & participants, director, sponsors, organizing committee and all staff members who made this event a grand success.

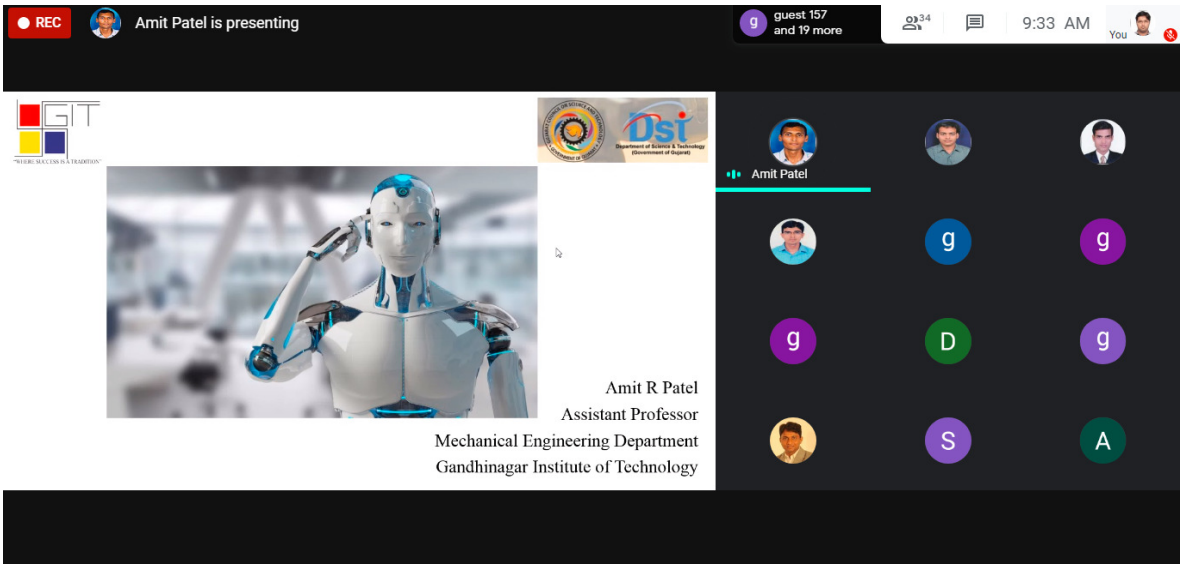


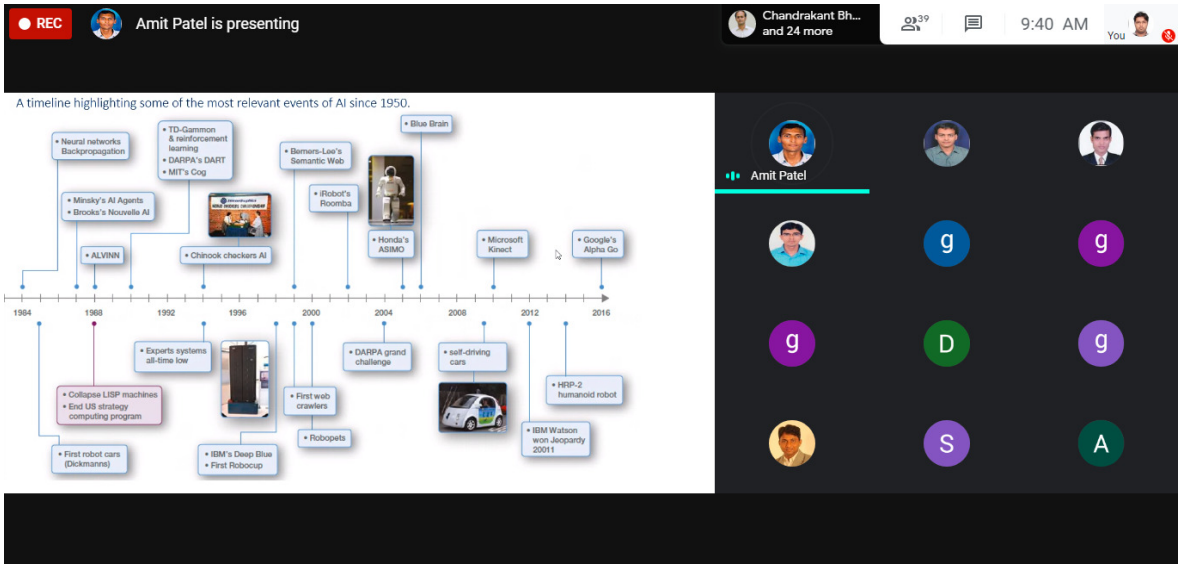
Speaker 1: Prof. Amit R Patel

(Assistant Professor, Mechanical Engineering Department, GIT)

Time: 9:30 am to 10:15 am

Prof. Amit Patel has expertise in area of Machine Design, Dynamics & Kinematics of Machine. From last 8 years he is actively working in field of robotics events in GIT.

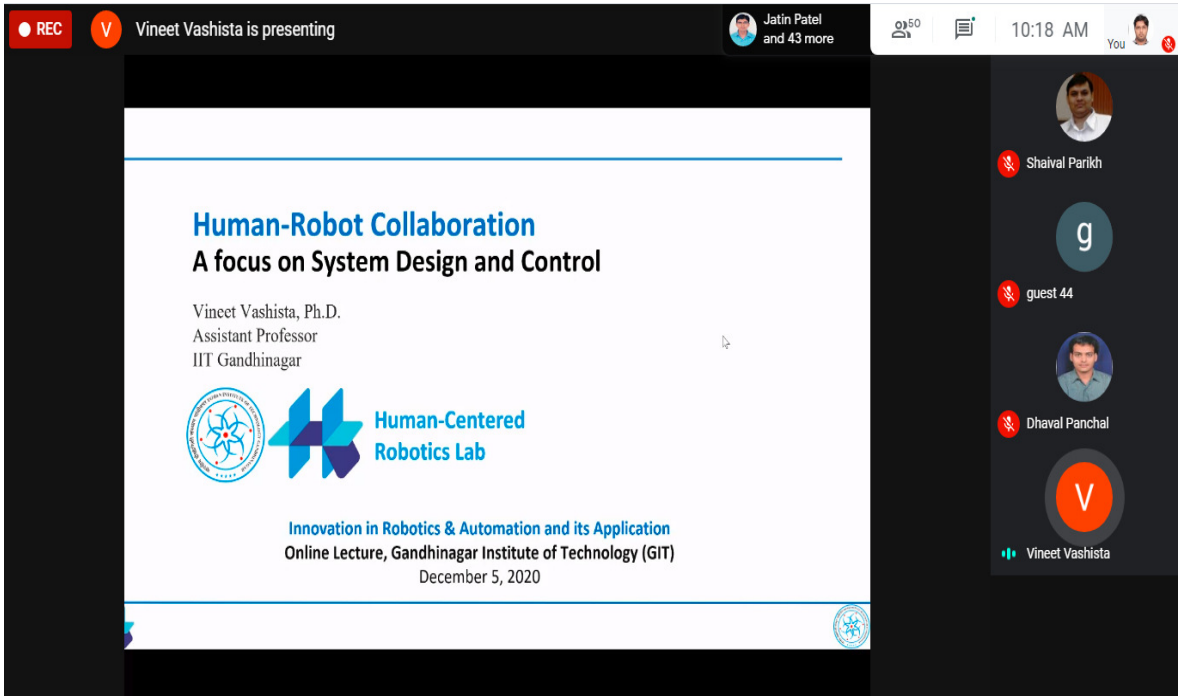


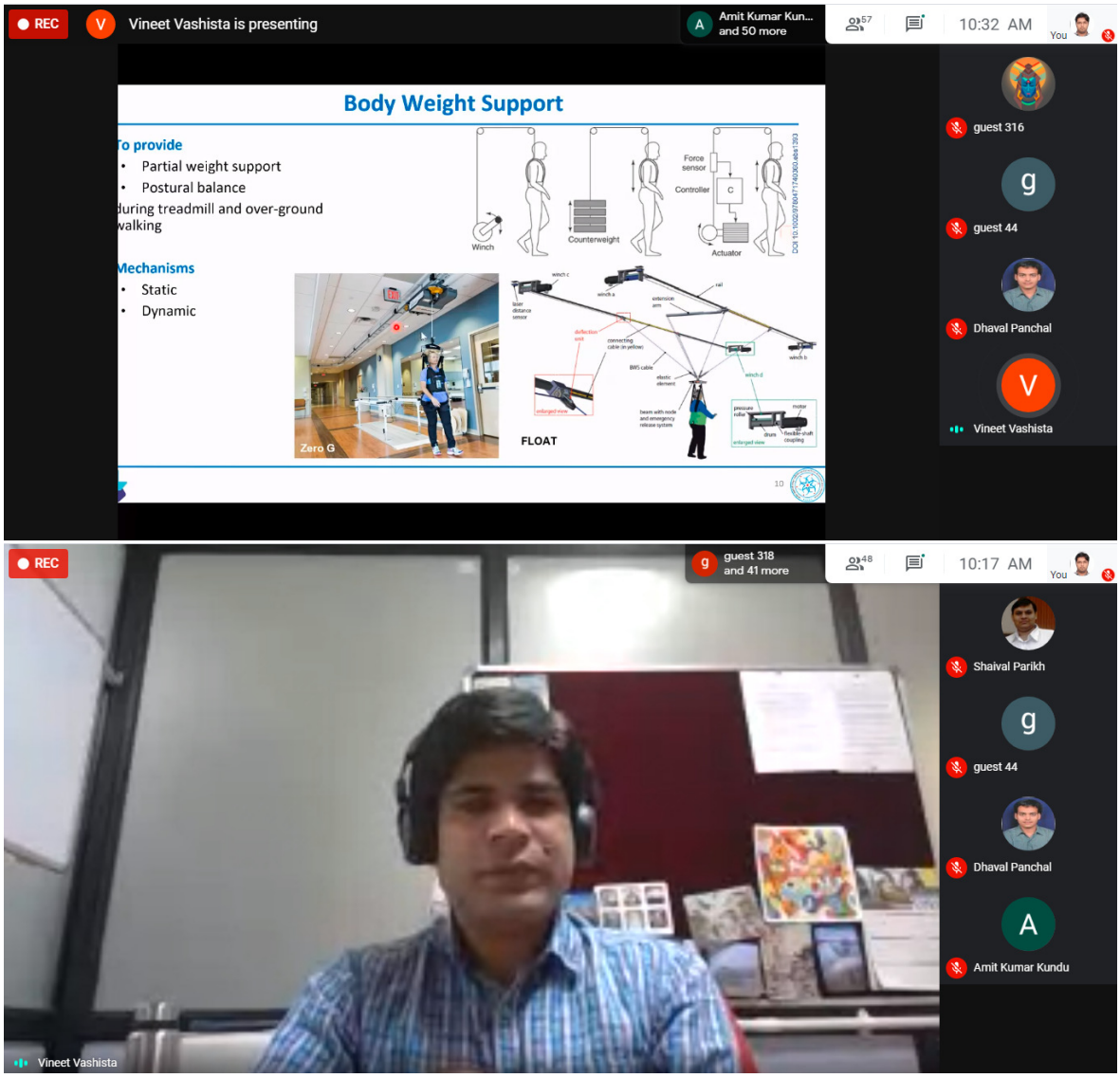


Prof. Amit Patel has explained the topic "AI in Robotics and Its application". He has explained about major companies involved in AI, the significant impact of AI Application and also the open sources available for AI. The presentation also involved the limitation of AI such as Lack of common sense, positive and negative human interaction, limited in terms of emotional intelligence, etc. Through this presentation the participants got the idea about in what way we can use AI so that it will be more useful in day-to-day life.

Speaker 2: Dr. Vineet Vashista
(Professor at IIT, Gandhinagar).
Time: 10:15 am to 11:30 am

Dr Vineet Vashista is a Assistant Professor in the Department of Mechanical Engineering at IIT Gandhinagar. His Research Interests is in field of Wearable & Rehabilitation Robotics, Human-robot Interaction, Cable-driven Robotics, and Human Movement Adoption.

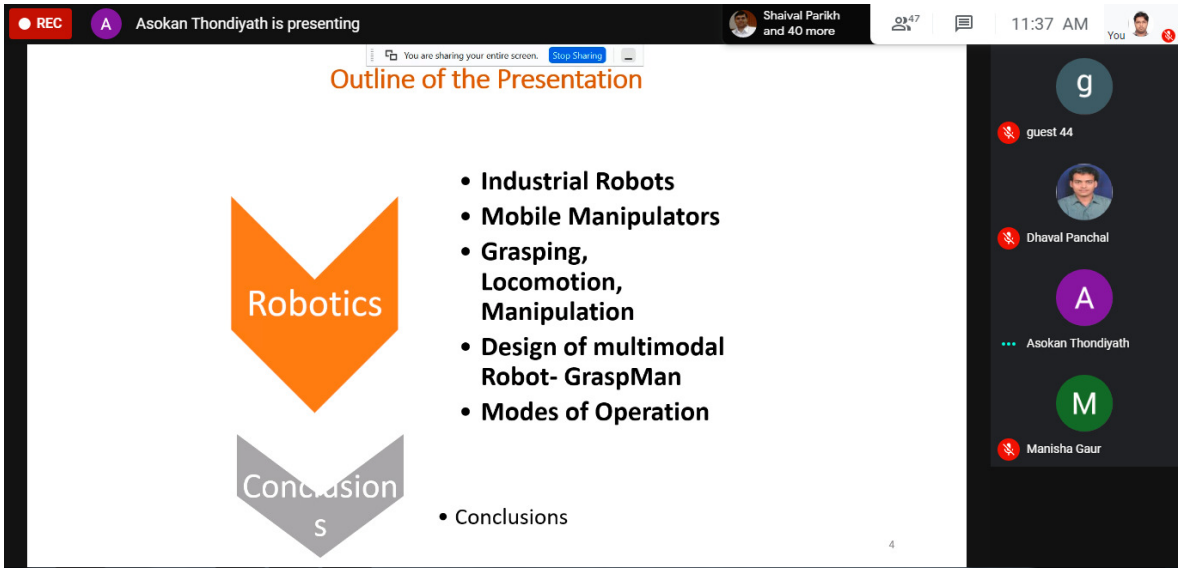


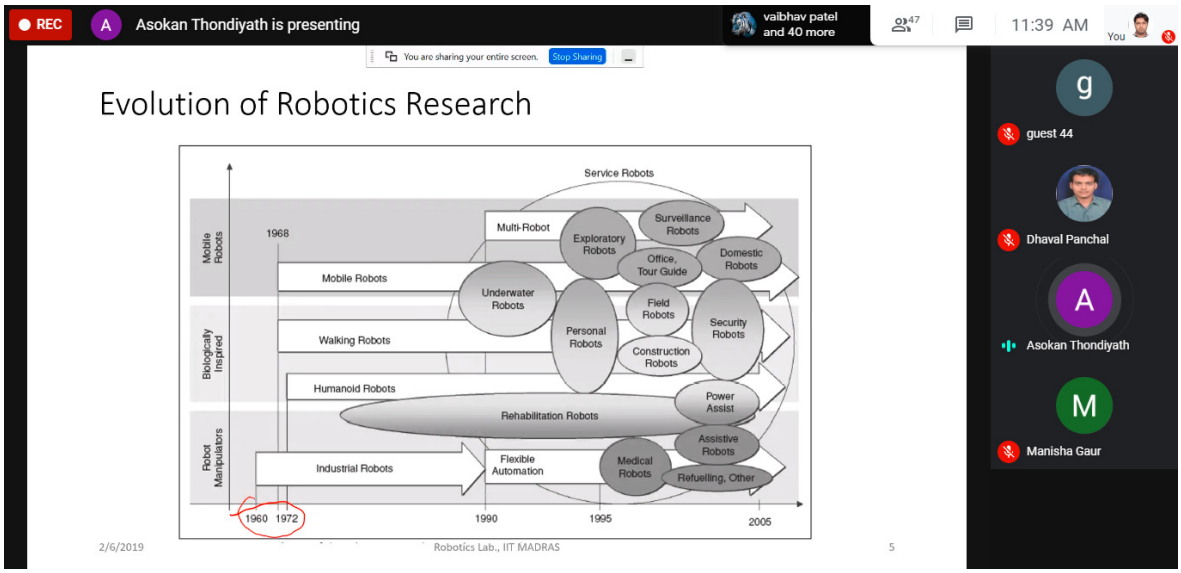


Dr Vineet Vashista has explained about “Human-Robot Collaboration - A Focus on System Design and Control”. In the presentation he has explained the basic three laws of robotics: A robot may not injure a human being; it must obey the orders giving by human being and it must protect its own existence as not as such protection does not conflict with the first or second law. He has also explained the significant prevalence of man neurological disorders. He focused on GAIT Rehabilitation and explain about training and recovery, and also explained about the need and opportunity to deploy robotic technology to assist recovery.

Speaker 3: Dr.T. Asokan
(Professor at IIT, Madras and Secretary, The Robotics Society)
Time: 11:30 am to 12:30 pm

Dr T Asokan is a Professor in the Department of Engineering Design, and currently the Head of the Department at IIT Madras. He spent six years as a researcher at the Robotics Research Center, Nanyang Technological University, Singapore working in mechatronic systems and robotics. He is actively involved in many sponsored research projects with an approximate budget of Rs. 500 lakhs, sponsored by DRDO, ISRO, DST, NRB and other sponsoring agencies.





Dr. T Asokan has explained about “Design and Control of Multimodal robots for industrial and field applications”. In the presentation he has covered industrial robots, mobile manipulators, grasping, and design of multimodal robots-grasp man. He has also explained evaluation of robotics research such as mobile robots, walking robots, humanoid robots and industrial robots. In that context he has explained about the fact that humanoid and industrial robots are not used as per their capacity in

India rather the humanoid robots merely used in reception work or some pick and place work. He has also explained the entertainment robots and space robots as well. The presentation also focused the varies kinemics chains used in the robotics.

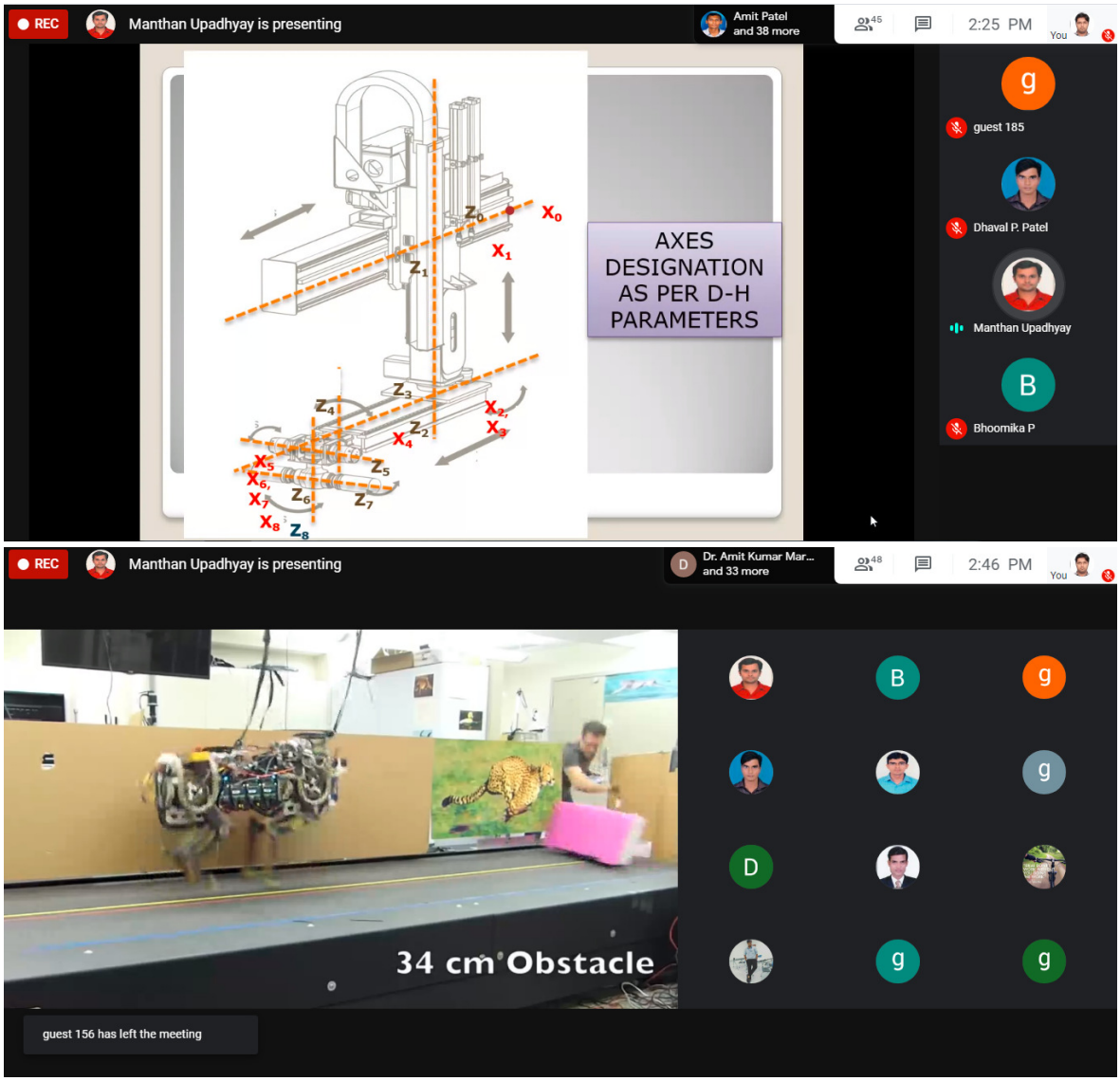
Speaker 4: Mr. Ketan Davda
(Sales head at Vision Embesoft solution)
Time: 1:00 pm to 2:30 pm

Mr. Ketan Davda has expertise in the areas of Product Development, Product Design and Automation. He had operated their firm Design Doctor (Duration January 2010 to at present) in which they did different types of special machines developed as per customer requirement.

During this presentation Mr. Ketan Davda has explained the vision system used in industries. The focus on kind of industrial automation that will improve the productivity as well as quality of the product. The presentation involved varies laser marking machines, the fastener inspection system, auto parts inspection and its comparison with manual inspection system. The participants would have the idea about hoe automation will be used in varies departments of industry. He also covers the simulation require for industrial automation to get a preferable output. The major focus is on how you can perfection with the help of robotics and automation as it is the need of new era of industry.

Speaker 5: Prof. Manthan Upadhyay
(Assistant Professor, Mechanical Engineering Department, GIT)
Time: 2:30 pm to 3:00 pm

Prof. Manthan Upadhyay has expertise in area of CAD/CAM, Machine Design & Robotics. He has attended various international & national workshops, conferences, and STTPs & organized various workshops in field of robotics.



In the presentation Prof. Manthan Upadhyay has explained “Multi axis robot for material handling application”. He has started with the axis designation based on D-H Parameters. The varies theories covered to justify the topic such as forward kinematic model and forward jacobian model. He also explained the computer algorithm in a step by step manner that could help participants to understand the whole simulation process gone through the required calculation and software. In the presentation the calculative simulation was being best be understood with help of the video of chittah robot.

Vote of Thanks: Prof. Nirav Joshi
(Head of Mechanical Engineering Dept, Gandhinagar Institute of Technology)
At the closing of session, Prof. Nirav joshi thanked to the all the experts. Prof S. K. Saha, Dr T Asokan ,Dr Vineet Vashista, Dr Mihir Chauhan, Mr. Kashyap K Ramaiya, Mr. Ketan Davda, Prof. Dhaval P Patel, Prof. Amit Patel, Prof. Manthan Upadhyay & Participants, Director, Sponsors, Organizing committee and All staff members who made this event a grand success.

Acknowledgement:

The Coordinating team is thankful to the Trustees, Director of the Institute, HODs, Faculty Members, Nonteaching Staff as well as Admin staff for their support and coordination in successful organization of the webinar. GIT Team is also grateful to GUJCOST for the financial help for the webinar. The webinar was also not possible without the involvement and coordination of coordinators, Prof. Jatin M Patel and Prof. Dhaval H Panchal. The Team of GIT appreciate their efforts for successfully organizing the program.

ગાંધીનગર ઇન્સ્ટિટ્યૂટ ઓફ ટેકનોલોજીમાં રોબોટિક્સ વેબિનાર

માણસની જેમ બધી દિશામાં ફરી શકે તેવા મલ્ટી ડાયનેમિક રોબોટ આવનાર વર્ષોમાં તૈયાર થશે

ગાંધીનગર ઇન્સ્ટિટ્યૂટ ઓફ ટેકનોલોજીના મિકેનિકલ એન્જિનિયરિંગ ડિપાર્ટમેન્ટન દ્વારા 'ઇનોવેશન ઇન રોબોટિક્સ એન્ડ ઓટોમેશન એન્ડ ઇટ્સ એપ્લિકેશન' વિષય પર વેબિનારનું આયોજન કરવામાં આવ્યું હતું. વેબિનારમાં આઇ.આઇ.ટી. દિલ્હીના ડૉ.સુબીર સાહાએ વાત કરતા કહ્યું કે, આધુનિક સમયમાં ટેકનોલોજી ક્ષેત્રમાં મોટા પ્રમાણમાં પરિવર્તન આવ્યું છે. રોબોટિક્સના પ્રવેશ સાથે દરેક કાર્યને ચોકસાઇપૂર્વક કરવાને લીધે કામકાજના બધા કાર્યક્ષેત્રને પ્રભાવિત કર્યા છે. રોબોટિક્સમાં વ્યકિતના જીવનની સાથે કાર્ય પદ્ધતિઓમાં સકારાત્મક પરિવર્તન અને સલામતીના સ્તરમાં વધારો કરવાની ક્ષમતા રહેલી છે. રોબોટિક્સ પ્રોગ્રામના આધારે એક ઝડપ સાથે પોતાનું કાર્ય કરે છે. શહેરોની સાથે ગામડાંઓમાં પાણી, ખેતી, હોસ્પિટલમાં ડૉક્ટર્સની જરૂરિયાત પ્રમાણે પ્રોગ્રામિંગ બનાવીને ઓટોમેટિક રોબોટનો ઉપયોગ કરીને કાર્યને વધુ સરળ બનાવી શકાય છે. રોબોટિક મિકેનિઝમ આવે તો વ્યકિતનો શ્રમ ઓછો થાય અને પ્રોડક્શનમાં વધારો થઈ શકે છે. વ્યકિતના શ્રમમાં ઘટાડો અને પ્રોડક્શનમાં વધારો થવાથી ઇન્ડ્રસ્ટીઝમાં રોબોટિક્સની ડિમાન્ડમાં વધી છે. તેમજ આઇઆઇટી મદ્રાસના પ્રોફેસર ટી.અશોકને કહ્યું કે, હાલના સમયમાં વિવિધ કંપનીઓમાં રોબોટિક્સ કામ કરે છે પણ આવનારા વર્ષોમાં મલ્ટી ડાયનેમિક રીતે રોબોટ તૈયાર કરવામાં આવશે જે વ્યકિતની જેમ બધી દિશામાં ફરીને કામ કરશે અને કે જરૂરી પણ બની રહેશે. સમગ્ર વેબિનારનું સંચાલન પ્રોફેસર જતીન પટેલ દ્વારા કરવામાં આવ્યું હતું સાથે મોટી સંખ્યામાં સ્ટુડન્ટસ, રિસર્ચર સહિતના લોકો જોડાયા હતા.