Virtual Labs

Don Bosco College of Engineering

Academic year 2019-2020

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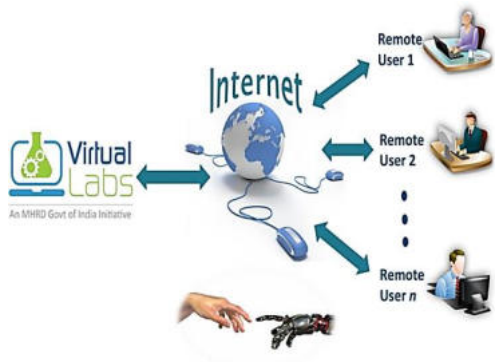
OVERVIEW

Virtual Labs project is an initiative of Ministry of Human Resource Development (MHRD), Government of India under the aegis of National Mission on Education through Information and Communication Technology (NMEICT). For the first time, such an initiative has been taken-up in remote-experimentation. Under Virtual Labs project, over 100 Virtual Labs consisting of approximately 700+ web-enabled experiments were designed for remote-operation and viewing. The intended beneficiaries of the projects are:

- All students and Faculty Members of Science and Engineering Colleges who do not have access to good lab-facilities and/or instruments.
- High-school students, whose inquisitiveness will be triggered, possibly motivating them to take up higher-studies. Researchers in different institutes who can collaborate and share resources.
- Different engineering colleges who can benefit from the content and related teaching resources.



OBJECTIVES

- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars.
- To enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- To provide a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self-evaluation.
- To share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distances

VIRTUAL LABS AT DON BOSCO COLLEGE OF ENGINEERING

Don Bosco College of Engineering is a nodal center for IIT Bombay for virtual labs from January 2019. Being a part of this project our Institute has been given various opportunities such as contribution to Vlabs through pedagogy design lab development and student internships, jointly with IIT Bombay.

DBCE as the Nodal Centre of the Virtual Labs, has been making effective use of the Virtual Labs platform in the execution of e-learning strategies for maintaining continuity of academic activities

In order to spread this mission of ICT aided experimental learning, Don Bosco College of Engineering has also conducted workshops at other Institutes to spread awareness by giving complete hands on training on how to use virtual labs.

DEPARTMENTAL ACTIVITIES

In order to carry forward the culture of learning and understanding experiments through virtual platform, we at DBCE have formed a team of faculty members from various disciplines. This team comprises of:

- Principal: Dr.Neena Panandikar
- Nodal & ETC Department Coordinator : Asst.Prof.Mathilda Colaco
- Nodal Technical & Mechanical Department Coordinator: Asst.Prof. Saurabh Raikar
- Civil Department Coordinator: Asst. Prof. Starina Dias
- Computer Department Coordinator: Asst. Prof. Nisha Godinho
- Science and Humanities Department Coordinator: Asst. Prof. Vaishali Parakhi

ELECTRONICS AND TELECOMMUNICATION ENGINEERING DEPARTMENT

The Primary objective of ETC Department has been to impart quality education, training and research at the undergraduate level in various areas of Electronics and Telecommunication Engineering in order to produce engineers of highest caliber. The curriculum offers broad coverage to all areas of Electronics and Telecommunication Engineering to give a strong foundation on various topics/areas such as Digital Systems Design, Electromagnetic Theory, Digital Signal Processing, Microprocessors and Microcontrollers, Electronic Circuits, VLSI Design, Communication Engineering, Control Engineering, and Microwave Engineering.

In order to impart an academic spirit towards nurturing professionals well-versed in theory and experiment,the Department of Electronics and Telecommunication Engineering has conducted various Virtual lab sessions in various domains.

VIRTUAL LABS SESSION ON "ELECTRICAL CIRCUITS AND SYSTEMS"

Prof.Mathilda Colaco conducted Vlabs session in Electrical Circuits and Systems on 16th July 2019.The main objective of the session was to make the students understand concepts of Mesh and Nodal Analysis through use of various tools like web-resources, video-lectures, animated demonstrations and self evaluation.

The session commenced with introduction to virtual labs which covered the basics of Mesh and Nodal Analysis with pre and post self evaluation tests providing complete knowledge in the topic. Followed was step by step explanation of the procedure as to how to virtually simulate the circuits and get the desired results. Students were given various activities like writing various applications based on the session.

FACULTY DEVELOPMENT TRAINING ON VIRTUAL LABS

The Electronics and Telecommunication Engineering department conducted a session on Virtual Labs for the faculty members of ETC Department on 10th January 2020 in Signal processing lab. The resource person for the session was Prof.Mathilda Colaco.

The aim of this session was to create an awareness on the utilization of web-based experiments, virtualization and simulations towards enhanced learning.

The session commenced with a brief introduction to virtual labs followed by registering to IIT Bombay site ,filling all the details. Faculty members were explained about various labs and were assisted as they performed experiments in their domain.

The faculty members showed their zeal enthusiasm in knowing about vlabs and they were keen on implementing it for the students.

The session ended with the feedback session. Overall it was very informative and interactive session

VIRTUAL LABS SESSION ON PLC

Prof.Anisha Cotta and Prof.Mathilda Colaco conducted Virtual labs session on PLC for T.E ETC Students on 4th and 6th February 2020.The main aim of the session was to make students understand concepts of Logic controller programming through use of various tools like web-resources, video-lectures, animated demonstrations and self-evaluation.

The lecture started with the introduction to virtual labs which covered the basics of PLCs with pre and post self-evaluation tests providing complete knowledge in the topic and step by step explanation of the procedure as to how to virtually simulate the PLC programs and get the desired results. Students were given various activities like writing programs for various applications based on the session.

VIRTUAL LABS SESSION ON MICROPROCESSOR AND INTERFACING

Prof.Trima Fernanades conducted Virtual labs session on Microprocessor and Interfacing on 6th May 2020.This session was conducted during lock down period. The main aim of the session was to make the students understand the concept of 8085 and how to program it.

COMPUTER ENGINEERING DEPARTMENT

The Department of Computer Engineering strives to enable students to acquire knowledge and skills in subjects of computer science, to enrich their personal, cognitive, social development, and to equip them for a challenging future.

To cultivate the habit of viewing a concept from the application perspective and enabling them to recognize the key areas of research and application development for societal benefits, the department of computer engineering has been conducting various virtual lab sessions.

VIRTUAL LABS SESSION ON "IMAGE PROCESSING"

The Computer department conducted a workshop on Learning Image Processing through Virtual Labs for the students of BE COMP on the 12th October 2019 in the C1 lab. It was two hour long session from 2p – 4pm organized by Prof. Janhavi Naik.
It started off with registering to IIT Bombay site filling all the details. Total of 20 students attended the workshop. Total target of 6 experiments were given to the students.
The whole scenario was explained to students along with working and concept. The mode of working, selecting and running steps were explained to them.

However some Students completed 7 experiments. They submitted the feedback for the same.
These are the list of experiments of Image Processing Lab.

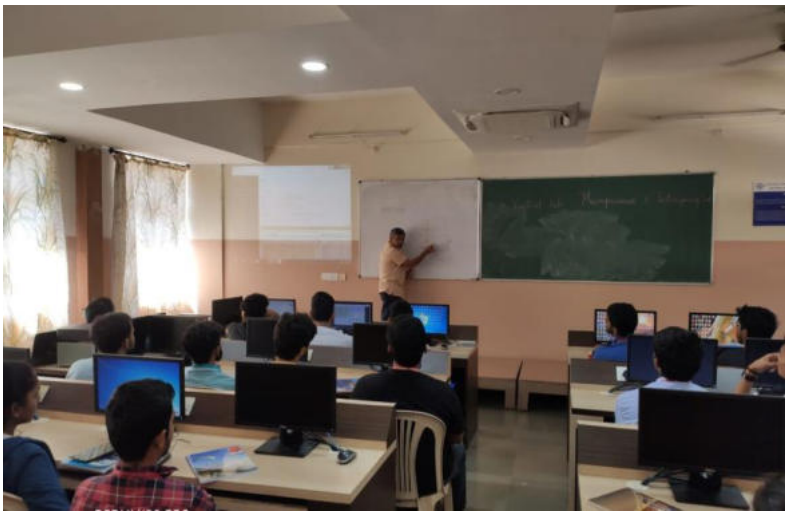
- Distance and Connectivity
- Image Arithmetic
- Point Operations
- Neighbourhood Operations
- Image Histogram
- Fourier Transform
- Image Segmentation

Apart from completing experiments, various quiz and assignments were also attempted by the students. Very well the questions were solved and output was found.
It was quite innovative and interactive way to visualize and learn the concept through virtual Labs.

VIRTUAL LABS SESSION ON "MICROPROCESSOR"

Prof.Vivek Jog conducted Virtual labs session on Microprocessor and Interfacing for S.E Computer students on 25th January 2020.The main aim of the session was to make the students understand the concept of 8085 and how to program it.

The session commenced with introduction to virtual labs which covered the basics of microprocessors with pre and post self-evaluation test providing complete knowledge in the topic. The students were given clear instructions on how to use virtual labs and also encouraged to try new experiments using the same..



VIRTUAL LABS SESSION ON DATA STRUCTURES

Prof. Shweta Morajkar conducted virtual lab session in Data Structures for S.E Comp on 27th January and 3rd February 2020.

The aim of this session was to make the students understand data structures in a more effective manner. The students were asked to try different applications in data structures using the simulator. The session ended with the feedback session. Overall it was very informative and interactive session

VIRTUAL LABS SESSION ON COMPUTER PROGRAMMING

Prof. Nisha Godinho and Prof.Mithil Parab conducted practicals in Computer Programming for F.E Comp and F.E ETC students on 15th May 2020..

The session was conducted during lockdown.The instructions to use virtual labs were explained clearly in online mode.

MECHANICAL ENGINEERING DEPARTMENT

The Department of Mechanical Engineering is in the forefront of promoting Industry Institute Interaction by organizing collaborative workshops, seminars, experts talks, field visits etc. It emphasizes on development of practical skills to make students employable and industry ready and so the department has made continuous efforts in conducting Virtual lab sessions in various domains.

VIRTUAL LABS SESSION ON "MACHINE DYNAMICS AND MECHANICAL VIBRATION"

Prof. Saurabh Raikar organized Virtual labs session in Machine dynamics and mechanical vibration for T.E Mech. Students on 30th September 2019..
The session commenced with brief introduction on virtual labs followed by step by step explanation of the procedure as to how to use the lab.The students performed the experiment on " Free vibration of Cantilever Beam. The main objective of the session was to find the damping of the beam using virtual labs. The students could give the desired dimensions for the beam and load, thus obtaining results as per their specification.

FACULTY DEVELOPMENT TRAINING ON VIRTUAL LABS

The Department of Mechanical Engineering conducted a training session on Virtual Labs for the faculty members of Mechanical Department on 16th January 2020 at Don Bosco College of Engineering.

Prof. Saurabh Raikar gave an introduction to Virtual Labs and explained its benefits for the students. The faculty members then performed experiments in their respective subjects using Vlabs and also discussed applications of this tool in the curriculum. The faculty also showed positive response and willingness to use this tool to conduct some experiments for the students.

VIRTUAL LABS SESSION ON METAL FORMING

Prof. Saurabh Raikar organized Virtual labs session in Metal forming and mechanical vibration for T.E Mech. Students on 24th January 2020.
The main objective of the session was to make the students understand, perform and visualize various processes in metal forming like Extrusion, Upsetting, Rolling, Forging, Riveting etc.

CIVIL ENGINEERING DEPARTMENT

The Civil Engineering department having qualified and experienced faculty in the areas of Structural and Geotechnical Engineering has been organizing various sessions in virtual labs to enhance the knowledge of the students using various simulations and animation videos.

VIRTUAL LABS SESSION ON "BASIC STRUCTURAL ANALYSIS , ENVIRONMENTAL SCIENCE, URBAN TRANSPORTATION SYSTEMS PLANNING"

Prof. Jeffrey Valadares, Prof.Prachi Dessai, Prof. Starina Dias organized Virtual labs session in Basic Structural Analysis , Environmental science, Urban Transportation Systems Planning for T.E CIVIL Students on 22nd October 2019.

The session commenced with brief introduction on virtual labs followed by step by step explanation of the procedure as to how to use the lab.The students were also encouraged to try more experiments by following the instructions mentioned in each experiment.

FACULTY DEVELOPMENT TRAINING ON VIRTUAL LABS

The Civil Engineering department conducted a session on virtual Labs for the faculty members of Civil Department on 29th January 2020. The resource person for the session was Prof.Starina Dias.

The aim of this session was to create an awareness on the utilization of web-based experiments, virtualization and simulations towards enhanced learning.

Faculty members were explained about various labs available as virtual labs followed by step by step explanation of how to use virtual labs and were also assisted as they performed experiments in their domain.

The faculty members showed their zeal enthusiasm in knowing about virtual labs and they were keen on implementing it for the students.

The session ended with the feedback session. Overall it was very informative and interactive session

SCIENCE AND HUMANITIES DEPARTMENT

In order to enhance the applicative aptitude of the students and make the concept more interesting. The department of Science and Humanities organized virtual lab sessions for the students in physics under various virtual labs available.

VIRTUAL LABS SESSION ON "ELECTRICITY AND MAGNETISM"

Prof. Harison Cota conducted Virtual lab session in Electricity and Magnetism for F.E Students from 22nd to 24th October 2019.

The aim of this session was to make the students understand the concept of Electricity and magnetism. The experiment that was conducted under this lab was Magnetic Field Along The Axis of A Circular Coil Carrying Current.

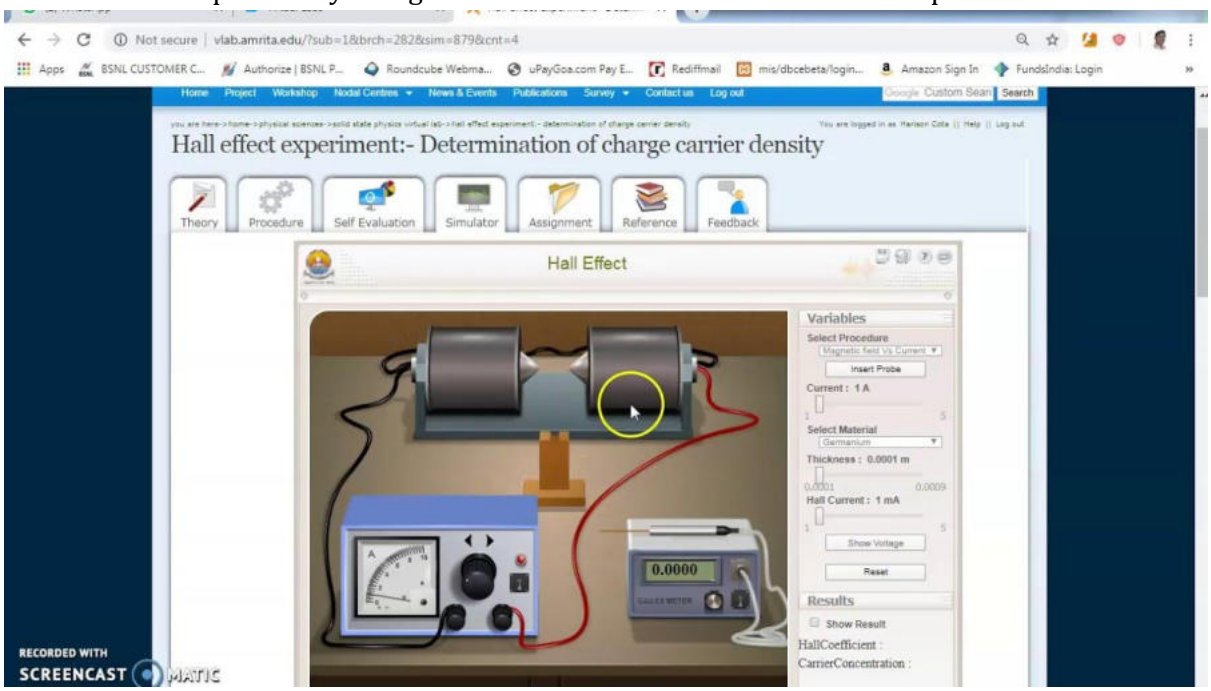
The session ended with the feedback session. Overall it was very informative and interactive session

VIRTUAL LABS SESSION ON SOLID STATE PHYSICS

Prof.Harison Cota conducted practicals in Solid State Physics using virtual labs on 1st and 2nd May 2020.

This session was conducted during lockdown period. The instructions of how to perform the experiment on Hall effect were clearly recorded and sent to the students.

The students responded by filling the feedback session at the end of the experiment.



FACULTY INITIATIVES

Virtual laboratories provides the merits of being used at anytime, anyplace, in this 'on-line learning' world of engineering education. They can be used to supplement the traditional learning modes. Furthermore, visualization permits an in-deep understanding of the learning content with beneficial consequence on the students' performances.

In order to spread this mission of ICT aided experimental learning, Don Bosco College of Engineering organized Virtual labs awareness session for the faculty members in different institutes

OUTREACH SESSION AT GOVERNMENT POLYTECHNIC CURCHOREM

Don Bosco College of Engineering conducted a session on virtual Labs for the faculty members of Government Polytechnic Curchorem (GPC) on 27th February 2020, at their college premises.

The aim of this session was to create an awareness on the utilization of web-based experiments, virtualization and simulations towards enhanced learning

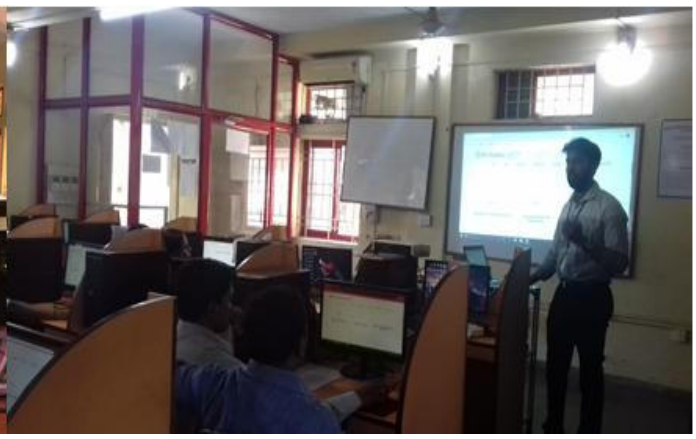
Prof. Mathilda Colaco provided an introduction to Virtual Labs and listed the benefits of becoming a Virtual labs nodal center.

Prof. Saurabh Raikar gave hands on session on how to use virtual labs and demonstrated various experiments in field of Mechanical, Electronics, Electrical and Computer Engineering.

The faculty members of GPC were then allowed to explore various other labs and were assisted as they performed experiments in their domain.

The faculty members showed their zeal enthusiasm in knowing about virtual labs and they were keen on implementing it for the students.

The session ended with the feedback session. Overall it was a very informative and interactive session.



OUTREACH SESSION AT FR. AGNEL POLYTECHNIC,VERNA

Don Bosco College of Engineering conducted a session on virtual Labs for the students of Fr.Agnel Polytechnic, Verna on 6th March 2020, at their college premises.

The aim of this session was to create an awareness on the utilization of web-based experiments, virtualization and simulations towards enhanced learning

Prof. Mathilda Colaco provided an introduction to Virtual Labs and listed the benefits of becoming a Virtual labs nodal centre.

Prof. Saurabh Raikar gave hands on session on how to use virtual labs and demonstrated various experiments in the field of Mechanical, Electronics, Electrical and Computer Engineering.

The Students of Fr. Agnel Polytechnic were then allowed to explore various other labs and were assisted as they performed experiments in their domain.

The students showed their zeal enthusiasm in knowing about virtual labs and they were keen on implementing it.

The session ended with the feedback session. Overall it was very informative and interactive session.

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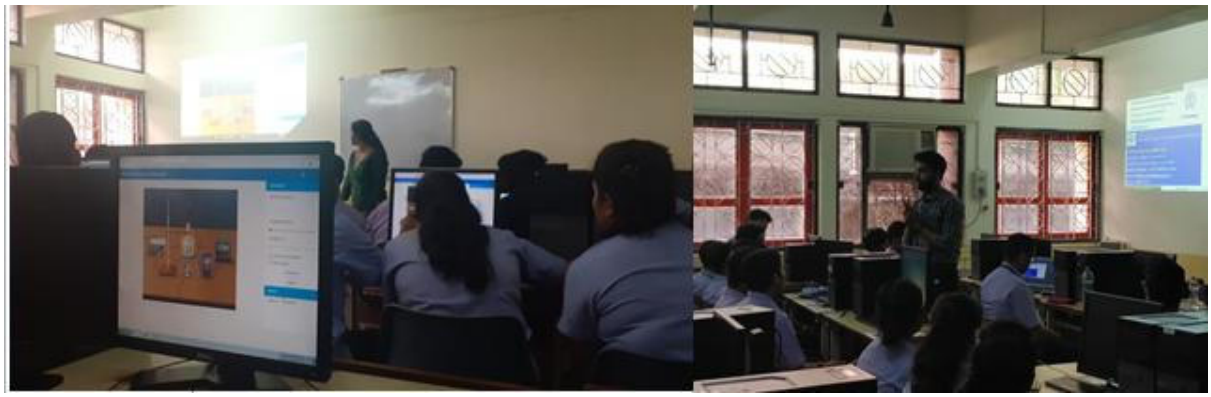

VIRTUAL LABS DEVELOPMENT

Don Bosco College of Engineering being the nodal center of virtual labs under IIT Bombay was given an opportunity to contribute to virtual labs through pedagogy design lab development and student internships, jointly with IIT Bombay.

Faculty from various departments showed their interest in developing virtual labs.

The faculty members were asked to submit the pedagogy document of their experiment to IIT Bombay. The template of the same was provided by IIT Bombay. The entire process comprised of various rounds ,where the faculty members were evaluated for the experiment. Only those who scored 5/5 in the pedagogy document could proceed to the next round.

The list of the faculty members and the lab name proposed for development is as follows:

Sr.No	Discipline	Faculty name	Lab name
1	Mechanical	Mr.Saurabh Raikar	Thermodynamics
2		Mr.Suraj Marathe,Mr.Joel Fernandes,Mr.Raymond Joseph	Production Process
3		Mr.Swapnil Ramani	Metrology and Quality Engineering
4	Electronics and Telecommunication	Mr.Deron Rodrigues / Mr. Yeshudas Muttu	Electronic Devices and Circuits II Laboratory
5		Ms.Priyanka Padiyar	Radio Frequency and Microwave Communication Lab
6		Ms.Mathilda Colaco	Mobile Communication System lab
7	Computer Science Engineering	Mr.Vivek Jog/ Ms. D.S Vidhya	Microprocessor Lab

Online training on virtual labs development was conducted by IIT Bombay for the faculty members of DBCE on 18th March 2020.

During the lockdown the faculty members developing the labs were given a Mentor according to their domain by IIT Bombay.
The faculty members were given various tasks based on their experiment, which they had to submit to their respective guide within a given deadline.
Prof.Priyanka Padiyar and Prof.Mathilda Colaco proceeded to the next round after scoring 5/5 in the pedagogy document and are currently working on story board which is the next round.

Compiled by:
Asst.Prof.Mathilda Colaco
Virtual labs Nodal center Coordinator
Assistant Professor in Electronics and Telecommunication Engineering Department.
Don Bosco College of Engineering