

A Review on Development of E-resources for Electronics Practical

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Abstract

The paper is a profuse tool of e-learning through online content and a study of its impact on the students. The approach is to maintain the students' interest, by providing them with a visualization and experimental form of devices by just a click of mouse. From past, there has been a foot print of many people towards the advancement in online content on various theoretical subjects of electronics but here we have discussed about the practicals performed in electronics [1]. This paper provides a review on the study of various electronics experiments based on digital and analog electronics using e-resources like animations, videos, e-manuals, power point presentations and also reviews the effect of these e-resources on students.

Keywords: Advancement, Animations, E-learning, Online, Presentations

I. INTRODUCTION

The modern era is shifting from the pen and paper to laptops and mobile phones and the advancements thus have made a paradigm shift in teaching as well as learning process [2]. Technology supports both teaching and learning and combines classrooms with various learning tools, such as computers and hand held devices and learning materials developed in form of animations, videos, manuals and presentations. Technology has made learning a very easy process which is available to the students for round the clock [3].

It is clear that the world of 21C learners has become an information age where digital skills are considered essential [4]. 'Back to basics' now means empowering students with the confidence, competence and skills to manage, analyze, and filter information, but also to create, develop and connect new information that solves social problems[4]. Therefore by considering the need of the hour attempt has been made to solve the problem of tech-savy students. These resources definitely build student skills, enhance student involvement, motivate students, increase learning capability and also have the capacity to

revolutionize teaching by building a new model which links teachers to their students in a very different and a more effective manner. Studies have shown that when taught through e-learning, students were more engaged and actively involved in their learning process and produced higher quality work [5]. Various online resources have been made available to the science and engineering students through this paper which will definitely help them to have a better understanding of the respective subject. Complete knowledge of the apparatus and the experiment beforehand gives a platform for learning with fun where the focus is on increasing the fundamental knowledge of concepts involved rather than the mechanical procedure of performing the experiment [6].

The online resources being discussed are in form of e-modules including animations, videos and power point presentations of various devices used in electronics practical. As observed by various researches [7], the students were able to understand a particular topic being taught by multimedia aids easily and even retained it for longer duration. The biggest benefit of multi-media learning is that the time, place and dynamics of learning are adjusted to the individual needs [8]. Even, the studies have shown that students gave a very positive feedback regarding the e-learning teaching aids. Almost all of them agreed to the fact that this method provides better understanding, provides a better foundation, students were able to perform practicals easily after watching these videos and definitely enjoyed learning [9]. So to give a better future to the digitized education a small step has been taken which is discussed in this paper.

II. DEVELOPMENT OF E-RESOURCES

Teaching electronic devices effectively is a challenging task, in the sense that it requires use of circuit diagrams, mathematical equations, function plots, and teaching various abstract concepts to the young mind [10]. There are various methods being followed across the world. One of the effective methods being followed is the use of an online Student Response System (SRS) in a pre-qualification course for engineering studies in Norway. In this approach, the

students answer quizzes using handheld mobile devices like Smartphones, iPads etc. has been developed at Sor-Trondelag University College, Norway [11]. Other effective method used for innovative teaching is use of tablet PCs with interactive software to teach IC design and illustrating through numerous examples how technology can facilitate active participation of students [12].

The following methodology was undertaken to develop e-resources:

1. First of all, the following devices and components to be studied were identified. The devices and the components are:
 - **Laboratory equipment:** CRO, DSO, Function Generator, Regulated DC Power Supply and Multimeter.
 - **Semiconductor Devices:** Diodes, MOSFET, Integrated circuits, IC tester.
 - **Optical instrument:** Spectrometer, Spectrophotometer
2. After exploring and doing an elucidate study on each devices/ components, manuals and power point presentation were developed.
3. Next, for demonstrating the practical operation of these devices/ components and their experiments videos were shot.
4. The next step was the development of innovative animations showing basic experiments of electronics performed by undergraduate science students using these devices and components.
5. Lastly, entire work was compiled and uploaded on the web porch "www.emanualz.wordpress.com".

III. WORK DONE AND TECHNOLOGY USED

The e-resources being developed are in form of animations, e-manuals, powerpoint presentations and videos. The e-module has been designed using the following open source softwares:

- Libre Office 4.2 was used to design Manuals and Powerpoint Presentations.
- Multisim and QUCS (electronic device simulation software) were used to make circuits and graphs.
- GIF maker was used to make animated images.
- Blender 2.59/2.71 was used to make animations.
- Video editing was done using Movie Maker.

Here we have given few screenshots of each. Screenshot of the website "www.emanualz.wordpress.com" is also given. Students pursuing engineering in electronics or in any other related branch can refer these findings for the better understanding of the concepts.

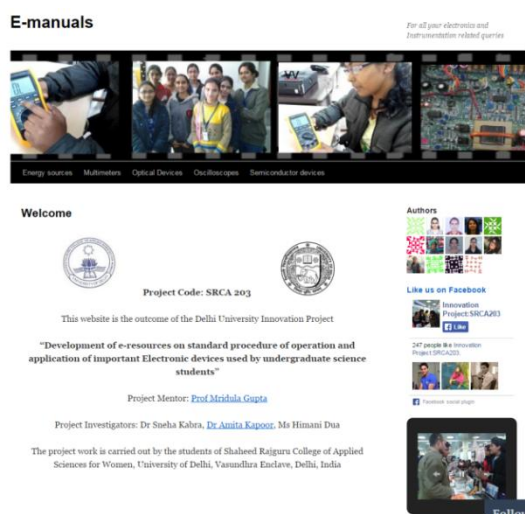


Fig.1: Screen Shot of the Website www.emanualz.wordpress.com [3]

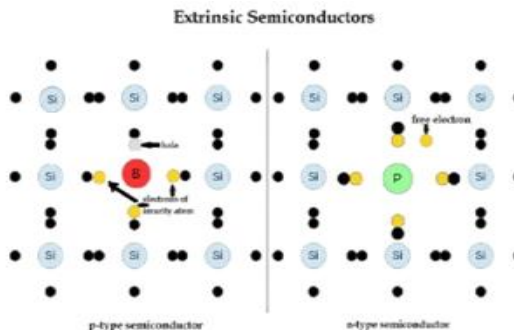


Fig. 2 Screenshot of the Image Showing Extrinsic Semiconductor [3]

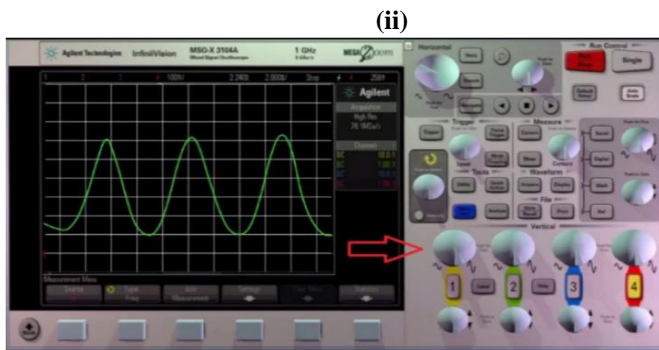
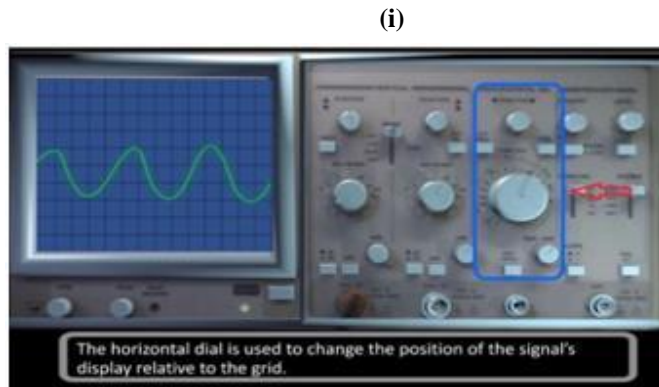


Fig. 3: Screenshot of the Animation Showing Description of Various Knobs Present on (i) CRO and (ii) DSO [3]

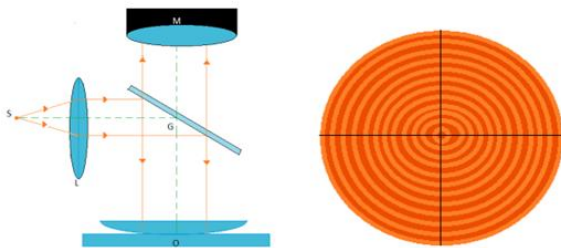


Fig. 4: Screenshot of the Animation Showing Description of Newton's Rings Experiment [13]

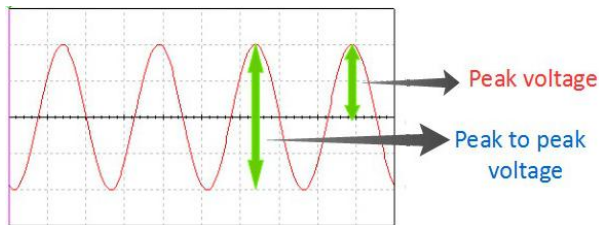


Fig. 5: Screenshot of the Animation Showing Screen of CRO [14]

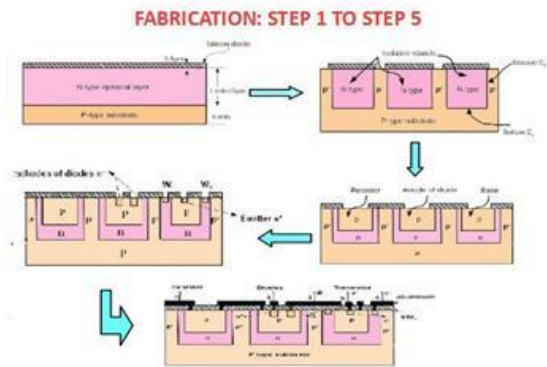


Fig. 6: Screenshot of the Image Showing Various Steps Present in IC Fabrication [3]

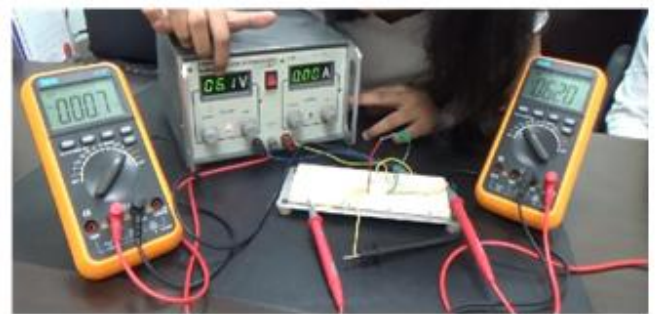


Fig.7: Screenshot of the video showing experiment on PN junction diode [3]



Fig.8: Screenshot of the Video Showing Experiment on Newton's rings [3]

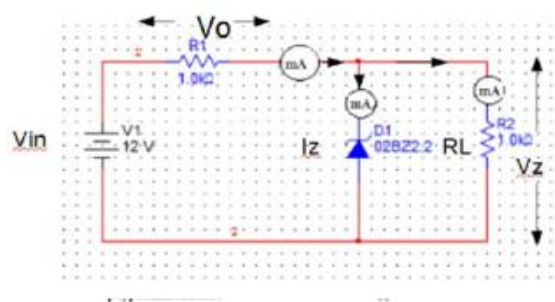


Fig.9: Screen Shot of the Zener Diode Circuit made by using Simulation Software Multisim [3]

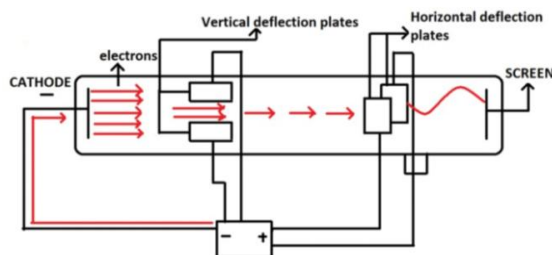


Fig.10: Screenshot of the GIFF Images Showing Internal Structure of CRO [3]

IV. RESULT AND CONCLUSION

Through this e-module the common problems faced by the undergraduate science students were analyzed and solved in an easy way. The developed e-resources would facilitate students with a material which is easy to understand. Simultaneously, this work can be advantageous for the beginners in this field as well as for those who are keen to learn about these devices. In the present scenario, where there is a shortage of time, all the concepts can be revised using these e-resources with a blink of eye. Hence, this can be proven as a better exposure of intellectual study for overall growth and better insight of the subjects. Research has shown that in students own perception, use of e-resources (videos, animations etc) give them better understanding and clarity of the subject and also increase their attentiveness and involvement in the class [10].

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