Electronic Circuit Simulation Software

Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

in

Computer Engineering

by

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2018-2019

CERTIFICATE

This is to certify that the project Synopsis entitled ***"Electronic Circuit Simulation Software"*** is a bonafide work of ***"Akshay Bhosle (15102003), Abhishek Dalvi (15102030), Mohit Ghare (15102010), Shantanu Veni (15102020) "***submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of ***Bachelor of Engineering*** in ***Branch Name.***

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Abstract

A virtual prototyping system for electronic devices, which incorporate visualization, that makes a combination of user interaction with photo-realistic 3D models. It basically helps to link product development with a modelling environment.

Electronic circuit simulation uses mathematical models to replicate the behavior of an actual electronic device or circuit. Due to its highly accurate modeling capability, many colleges and universities use this type of software for the teaching of electronics technician and electronics engineering programs.Simulating a circuits behavior before actually building it can greatly improve design eciency by making faulty designs known.

Also, it creates a huge amount of increase in product reliability, quality and fulllment of user requirements.

Introduction

Simulation is the imitation of a real environment. It is software program that allows the user to observe an operation virtually, without actually performing that operation. Being free from the disasters that take place during training sessions with circuits/electronic devices, a simulation software looks upon all physical limitations The act of simulating something rst requires that a model be developed; this model represents the key characteristics, behaviors and functions of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

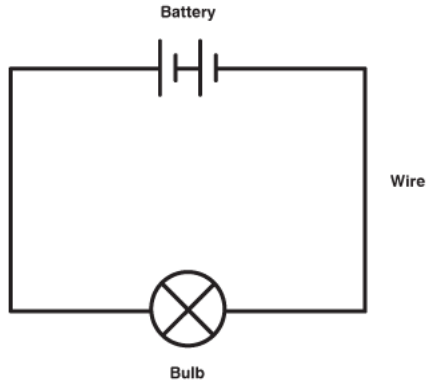


Fig 1.1 A basic electronic circuit

Objectives

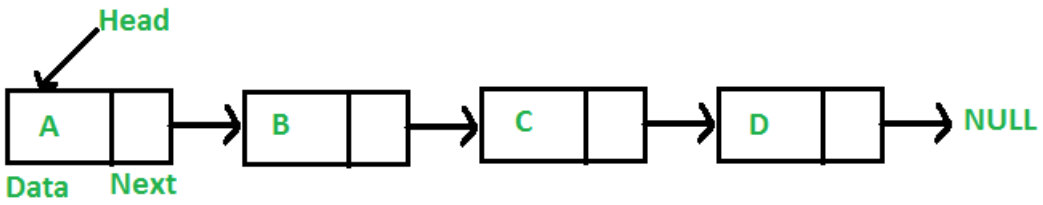
- A 3D visualized simulation of electronic circuits
- Interactive, vivid and intuitive
- Easy understanding of the basic theory of circuits

Literature Review

With the extensive application of computer multimedia technology, many universities use simulation software into the electronics classroom teaching process, thus, we can display abstract concepts and theories with specific graphics and sound. Using of software in the classroom simulation and presentation can enhance perceptions of students, also, in this way, students can learn both the basic use of various instruments and circuit parameters of the test methods to make teaching and learning in the classroom to form a good interaction.

Von Neumann cellular automata are the original expression of cellular automata.In general, cellular automata (CA) constitute an arrangement of nite state automata (FSA) that sit in positional relationships between one another, each FSA exchanging information with those other FSAs to which it is positionally adjacent. In von Neumanns cellular automaton, the nite state machines (or cells) are arranged in a two-dimensional Cartesian grid, and interface with the surrounding four cells.

A linked list is a linear data structure, in which the elements are not stored at contiguous memory locations. The elements in a linked list are linked using pointers as shown in the below image:



Linked List Representation

In simple words, a linked list consists of nodes where each node contains a data field and a reference(link) to the next node in the list.

Problem Definition

To develop a 3D simulation of electronic circuits that is interactive and real time, such that students easily understand the basic theory of circuits. Real-time simulation refers to a computer model of a physical system that can execute at the same rate as actual wall clock time. In other words, the computer model runs at the same rate as the actual physical system.

Proposed System Architecture/Working

Real Time Circuit Simulation Software, that helps in prototyping basic circuits. The real time nature helps to get instantaneous output according to the specified input parameters.

The system is based on storing object references of connected components in arrays.The data stored in these arrays is used to check connection and compute the output.

Each Object consists of two arrays, that act as a custom linked list.The final object that completes the connection stores all the data of the previous connected objects.This helps in optimizing the connection check in a real time environment

Summary

Simulation is going to be the innovation of the future, due to its ease of functioning. Also, due to overcoming physical limitations that are possible in a real environment. So, developing a circuit simulation can be really eective especially for educational purposes, for better understanding of concepts and ideas, also implementation of the same.

References

[1] Dong Jie,"Simulation Software applied in Electronic Technology teaching", School of Information Engineering, Shandong Youth University of Political Science Jinan, China ,2012

[2] Realtime Simulation "https://en.wikipedia.org/wiki/Real-time_simulation"

[3] Von Neumann Cellualr Automata https://en.wikipedia.org/wiki/Von_Neumann_cellular_automaton