A Project Report on

Electronic Circuit Simulation Software

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Computer Engineering

by

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Approval Sheet

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CERTIFICATE

This is to certify that the project report 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 ***Computer Engineering.***

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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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 efficiency by making faulty designs known.

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

Contents

Chapter 1

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 first 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.

1.1 Objectives

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

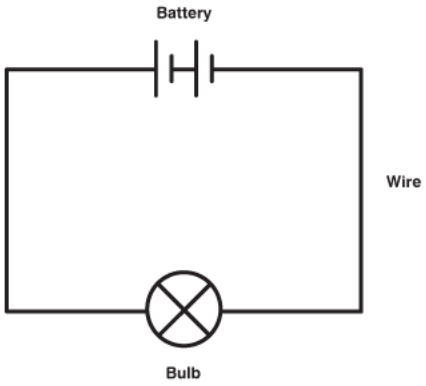


Fig 1.1 A basic electronic circuit

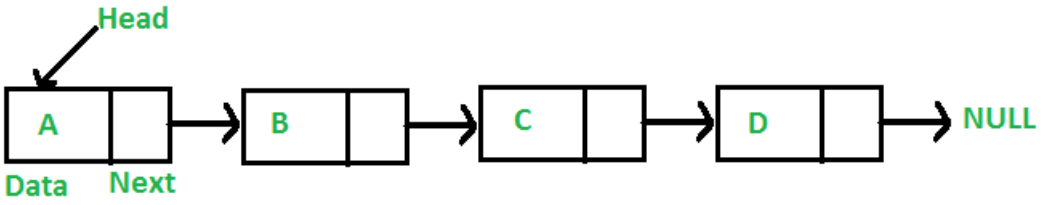
Chapter 2

Literature Review

Von Neumann cellular automata are the original expression of cellular automata.In general, cellular automata (CA) constitute an arrangement of finite 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 Neumann's cellular automaton, the finite state machines (or cells) are arranged in a two-dimensional Cartesian grid, and interface with the surrounding four cells.

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.

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

Chapter 3

Problem definition

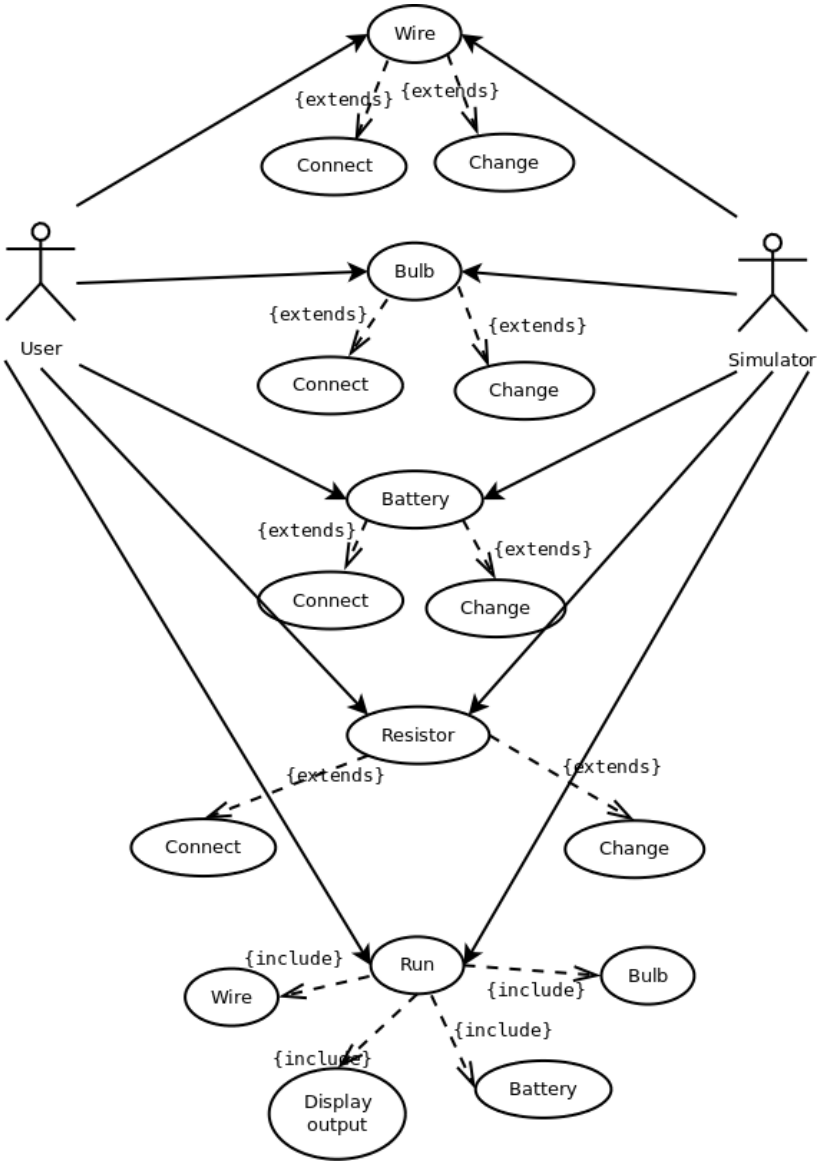
To develop a 3D simulation of electronic circuits that is interactive and real time, so that students easily understand the basic theory of circuits.

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.

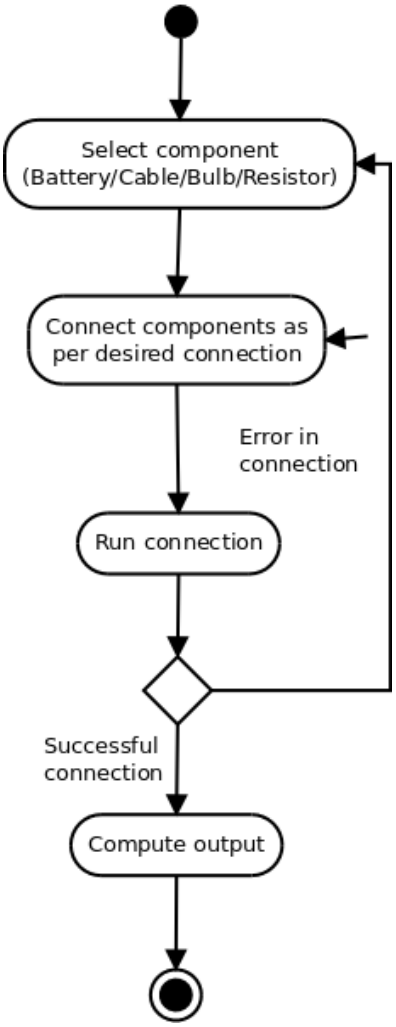
Chapter 4

UML Diagrams

4.1 USE CASE DIAGRAM



4.2 ACTIVITY DIAGRAM



Chapter 5

Technical review

5.1 Technology stack

1. DirectX12
2. OpenGL
3. Unreal Engine

5.2 Dependencies

1. c++
2. OpenGL

Chapter 6

Conclusions and Future Scope

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

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