**A Project report**

**On**

**<Project Title>**

###### *Submitted in partial fulfillment for the*

###### *award of the degree*

**Bachelor of Technology**

By

**<Student Name>**

**<Enrollment Number>**

*Submitted to*



**Department of Computer Science & Engineering**

**Sir Padampat Singhania University**

**Udaipur 313601 Rajasthan India**

##### *Under the supervision of*

##### <Guide Name>

**Department of Computer Science & Engineering**

##### Sir Padampat Singhania University

##### Udaipur 313601 Rajasthan India

**DECLARATION**

I ……………………….., student of B.Tech.(CSE), hereby declare that the project titled “……………………………………………..” which is submitted by me/us to the department of Computer Science & Engineering , School of Engineering, Sir Padampat Singhania University, Udaipur, in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology, has not been previously formed the basis for the award of any degree, diploma or other similar title or recognition.

Name and signature of Student:

Udaipur:

Date:

**CERTIFICATE**

This is to certify that the project entitled ‘………….………………………’ being submitted by ………………………………., in partial fulfillment of the requirement for the award of Bachelor of Technology, has been carried out under my supervision and guidance.

The matter embodied in this report has not been submitted, in part or in full, to any other university or institute for the award of any degree, diploma or certificate.

<Name of the Guide>

<Designation>

Department of Computer Science & Engineering

Sir Padampat Singhania University

Udaipur 313601 Rajasthan India

<Name of Head of Department>

<Designation & Head>

Department of Computer Science & Engineering

Sir Padampat Singhania University

Udaipur 313601 Rajasthan India

**Acknowledgement**

I would like to express my sincere gratitude to my project guide <NAME OF PROJECT GUIDE> for giving me the opportunity to work on this topic.

It would never be possible for us to take this project to this level without his innovative ideas and his relentless support and encouragement.

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….

Name of Student

(Enrollment Number)

**Abstract**

**CONTENTS**

**DECLARATION i**

**CERTIFICATE** ii

**ACKNOWLEDGEMENT** iii

**ABSTRACT i**v

**TABLE OF CONTENTS** v

**LIST OF TABLES** vi

**LIST OF FIGURES** vii

**LIST OF ABBREVATIONS** viii

**CHAPTER 1 1**

**INTRODUCTION (**Times new roman, 14) **1**

1.1 Section in the Chapter (times new roman, 13) 1

1.1.1 Subsection (times new roman 12) 1

**CHAPTER 2 2**

**LITERATURE REVIEW 2**

**CHAPTER 3 ……………………………… 3**

**CHAPTER 4 ………………………………**

**CHAPTER 5 ………………………………**

**CHAPTER 6 ………………………………**

**CHAPTER 7 ………………………………**

**CHAPTER 8 CONCLUSIONS AND FURTHER SCOPE OF WORK**

**REFERENCES**

**APPENDIX**

**GUIDELINES FOR PREPARING THE REPORT**

* The project report should be submitted in **A4** size. Number of copies to be ***submitted:*** Three (One for personal, One for department, One for Internal Guide). The certificate should consists of names and Enrollment numbers of all members for the above three copies.

**Paper, Typing , Format:**

* Paper (A4 size) should be used for the preparation of the project report. Typing should be done on one side of the paper with character font in **size 12 (Title 16, Sub Title 14)** of **Times New Roman.**
* The layout should provide a margin of **4 cm** on the left, **3 cm** on the top and bottom and **2 cm** on the right.

i.e. Left margin space 4 cm

top and bottom margin space 3 cm

Right margin space 2 cm

* Fresh paragraph should commence after **five spaces. One and half line** spacing shall be provided throughout the report.
* The page numbers should be indicated at the bottom-middle of the each page.
* Should not underline the heading/subheadings and should not put colons (: ) in headings or subheadings.
* Chapter name should be bold and centered.

## Binding

* The report shall be properly hard binded. The front cover should indicate in suitable embossed letter the following:

### First page

The first page include as provided above

### Second page

The second page may include the Declaration by student

### Third Page

The third page may include the Certificate by Guide.

### Fourth Page

The fourth page may include the Acknowledgement

### Fifth page

The fifth page should contain an abstract of the Project report. The candidate may emphasize here his/her contributions.

### Sixth and Seventh Page

In this page, a table of contents, list of tables, list of figures, and photographs and notation must be provided.

Important Note:

* **All the above pages are to be numbered in Roman numerals of lower case. Ex. i,ii,iii,iv,…**
* **The document pages must be numbered using numbers i.e. 1,2,3……**

### Arrangement of Chapters

The following is suggested format for arranging the project report matter into various chapters:

1. Introduction

This chapter must describe introduction about your project (1-5 Pages).

1. Literature Survey/Review of Literature/Problem identification (1-3 Pages).
2. Software Requirement Analysis(2-5 Pages)
   1. Define the problem
   2. Software and Hardware Requirements
   3. Define the modules and their functionalities

5. Software Design (4-8 Pages)

The design part must include the following items

* + - UML diagrams. This UML diagrams must include the following

Class Diagrams

Interaction diagrams-Sequence and Collaboration diagrams

Activity Diagram

Use case diagrams

* + - Database Design

For database projects, the report must include the following items.

* + - * + E-R Diagrams

1. Coding /Code Templates (3-5 pages)

Consist of coding or code outline for various files

Explain each class with functionality and methods with input and output parameters.

For Database projects, the report consisting of

* + - * + Tables – explaining all fields and their data types
        + Stored procedures (PL/SQL)

1. Testing (1-3 Pages)

Various test cases (two or three) for black box and white box testing

1. Output Screens (2-5 Pages)

Should include all user interfaces and output screens.

1. References/Bibliography (1 Page)
2. Appendices (if any).

The project report should be: Min 40 pages

Arrangement of Paragraph in a Chapter:

* Each paragraph in a chapter should be properly numbered for example, 2.1, 2.2 etc., where first digit represents the Chapter Number and second digit the paragraph number. There is no need to indicate the number for the first paragraph in a chapter.
* Sub-paragraphs, if any indicated as 1.1.1, 1.1.2 etc. i.e. first digit representing the chapter, the second representing the paragraph and third representing the sub-paragraph.
* **Don’t underline the headings or subheadings or side heading**. Instead use the bold letters.

### Photographs/Figures and Tables

* The figures, photographs and tables occuring in a chapter may be serially numbered as Fig. 1.1, 1.2 etc., where the first digit represents the chapter, the second digit represents Figure number.
* The photographs may be represented as Photo 1.1, 1.2 etc., the first digit representing chapter and the second digit represents Photograph number.
* The tables may be represented as Table 1.1, 1.2 etc., the first digit representing chapter and the second digit represents table number.

### Graphs

* The graph should clearyly indicate the points, which are used for drawing the curve or curves.

All the letters in the graphs should be written with stencils.

### Bibliography or References:

* The following format may be used for writing the Bibliography/References.

Author Name, Title of the book or paper, Publisher name, year.

Eg:

Berry, Jason, Jonathan Foose, and Tad Jones. Up from the Cradle of Jazz: New Orleans Music Since World War II. Athens: U of Georgia P, 1986.

(An article in a journal)  
Booth, Wayne C. "Kenneth Burke's Way of Knowing." Critical Inquiry 1 (1974): 1-22. Winks, Robin W. "The Sinister Oriental Thriller: Fiction and the Asian Scene." Journal of Popular Culture 19.2 (1985): 49-61.

* **The bibliography list should be made strictly in alphabetical order of the name of the authors**.

SAMPLE COPY

# LIST OF FIGURES

**Figure No. Description Page No.**

Chapter 1

1.1 Caption of the Figure x

1.2 Caption of the figure y

Chapter 2

2.1 Caption of the Figure p

2.2 Caption of the figure q

**LIST OF TABLES**

**Table No. Description Page No**

Chapter 1

1.1 Caption of the Table x

1.2 Caption of the figure y

Chapter 2

2.1 Caption of the Table p

2.2 Caption of the Table q

**LIST OF ABBRIBIATIONS**

**ABBREVIATION DESCRIPTION**

QCD Quantum Chromodynamics

CPU Central Processing Unit

ALU Arithmetic and Logical Unit

# CHAPTER 1

# INTRODUCTION

Physics is a branch of science that seeks to understand and explain the fundamental principles governing the behavior of matter, energy, space, and time. To explain these phenomena occurring around us we have to first understand the laws which contributes to govern them. The most crucial role in shaping the physical interaction of particles and each body in this cosmos are the 4 fundamental forces that are- Gravitation, Electromagnetic, Strong Nuclear, and Weak Nuclear forces. So, to understand how things work in this cosmos we have to first understand these 4 types of fundamental forces.

1. Gravitational Forces- This force describes the attraction between 2 or more masses due to their mass and distance between them. This force was first described by Sir Isaac Newton.
2. Electromagnetic Forces- It is responsible for interaction between charged particles. It consists of both electric and magnetic forces. Maxwell’s Equation describes the unified theory of Electromagnetism.
3. Strong Nuclear Force- fundamental forces that bind quarks together to form protons and neutrons within atomic nuclei. The strong force is crucial for maintaining the stability of atomic nuclei by overcoming the electrostatic repulsion between positively charged protons. Quantum Chromodynamics (QCD) describes this force in terms of quarks and gluons.
4. Weak Nuclear Force- This force came into picture when change in type of elementary particle changes (like in decays) occurs.

However, in the present scenario we are only going to deal with gravitational force and electrostatic part of electromagnetic force.

* 1. **Introduction to Central Idea.**

To understand nature and behavioral pattern of particles and all bodies in the universe we first need to define their interactions with each other and due external sources. Here comes the term Dynamics which is defined as “this is branch of mechanics or Physics that deals with the study of forces a motion and their effects on objects.” It consists of study of many other useful concept to study their dynamics, some of them are: -

1. Forces (electrostatic and gravitational)
2. Acceleration
3. Velocity
4. Speed
5. Displacement
6. Position vectors
7. Energy (Kinetic and Potential)
8. Linear Momentum
9. Angular Momentum
10. Torque

Dynamics is of 2 types on basis restrictions: -

* + - 1. Central- Force Dynamics / Celestial Mechanics- branch of dynamics that deals with the internal interactions of particles within an isolated system, without considering external forces or influences.
      2. Terrestrial Mechanics / Classical Mechanics- branch of dynamics that deals with interactions of celestial bodies in space including external effects.

Our Project is going to deal with Central- Force Dynamics.

* 1. **Application for 3-D Physics Simulator**

This project has many applications. Some of its applications are: -

* + 1. **Revolutionizing Physics Education**

Visualizing Abstract Concepts: Our simulator allows students to visualize abstract physics concepts in 3- D space using graphs and other animations making it easier for them to grasp ideas.

Interactive learning: students can actively engage with simulator by manipulating variables and parameters. This would deepen their crust knowledge of even difficult Physics concepts.

Real- World Application: it includes real life scenarios which will help students bridge the gap between theoretical knowledge and practical relevance.

* + 1. **A 3D Particle- Based Fluid Simulator for scientific Exploration**

As we recognize that fluids are comprised of particles in constant motion, our ongoing research and development efforts aim to extend the capabilities of our simulator to encompass the intricate behaviors of liquids and gases. This innovative step opens doors to a comprehensive Fluid Dynamics Simulator that can simulate fluid flow, turbulence, and various fluid properties.

* + 1. **From Fluid Simulation to Weather Prediction**

Our aspiration is to extend the application beyond its current scope, transforming it into a tool that can analyze and predict weather conditions. By incorporating meteorological data and atmospheric parameters into the existing particle-based system, our goal is to create a Weather Prediction Simulator that provides insights into climate patterns, air currents, and potential weather events.

* + 1. **Advance Data Visualization Module for Experimental Physics Outcome**

The primary objective of this module is to streamline the process of drawing meaningful insights from experimental data, eliminating the challenges associated with manual analysis and interpretation. By leveraging the powerful computational capabilities of our simulation, we aim to provide researchers and scientists with a tool that can handle the intricacies of experiments involving particle collisions, plasma dynamics, and other cutting-edge technologies. It could be used in many fields like: -

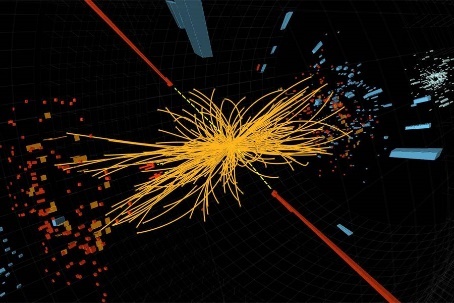
1. Particle Colliders- The Data Visualization Module is particularly valuable for experiments conducted in particle colliders like the LHC (Large Hadron Collider), RHIC (Relativistic Heavy Ion Collider), KEK, SLC, etc. It aids researchers in deciphering intricate particle interactions, identifying new particles, and understanding the fundamental forces at play.

Fig 1-1 Particles colliding in particle collider

1. Tokamak Technology- In the context of emerging Tokamak designs for controlled nuclear fusion, the hello
   module facilitates the analysis of plasma behavior and magnetic confinement, offering insights crucial for the development of sustainable energy solutions.

Fig 1-2 Tokamak Nuclear Fusion Reactor

# CHAPTER 2

# BACKGROUND SURVEY

In this documentation of comprehensive review, we are going to discuss and establish important Physics formulas which are going to be very important in understanding the very essence of our project later.

* 1. **Vector Analysis**

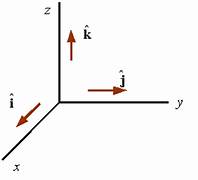
A vector quantity is one which accompany direction with magnitude. We are going to use standard Cartesian System for defining direction of vector i.e., 3 directions.

Fig 2-1 Vectors in 3 directions

* + 1. **Vector Addition**

Vector addition could be done such that of 1 vector could be scalarly added by of another vector. Same applies for subtraction of vectors.

Eg-

and

Then

* + 1. **Vector Multiplication**

Multiplication of 2 vectors could be done by solving following determinant: -

(1.0)

and

* 1. **Force**

We are going to deal with 2 types of force Gravitation Force and Electrostatic Force.

* + 1. **Gravitational Force**

Force exerted on a body with mass due to attraction of another mass body is known as Gravitational Force. First, we will see scalar form of Gravitational Force: -

(1.1)

Where, = mass of particle 1

= mass of particle 2

Universal Constant of Gravitation

distance between 2 masses

magnitude of (force on particle 1 by particle 2)

magnitude of (force on particle 2 by particle 1)

Force is a vectorial quantity and thus calculating magnitude is not sufficient at all without direction. So now we will calculate Gravitational Force vectorially.

(1.3)

(1.2)

Let coordinate of be and coordinate of  be then

(1.5)

(1.4)

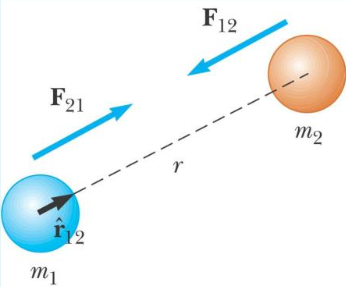


Fig 2-2 Gravitational Force

* + 1. **Electrostatic Force**

Force acting on a static charge particle by another static charge which could be either +ve and -ve is known as Electrostatic Force. It is to be noted we are dealing with dynamics i.e.; motion of particles and motion of charges particle will also accompany magnetic effects but for now we are avoiding that part of Electromagnetism. But we would definitely consider in future. Again, first we will see the scalar part of this force: -

(1.6)

Where, = mass of particle 1

= mass of particle 2

Universal Constant of Gravitation

distance between 2 masses

magnitude of (force on particle 1 by particle 2)

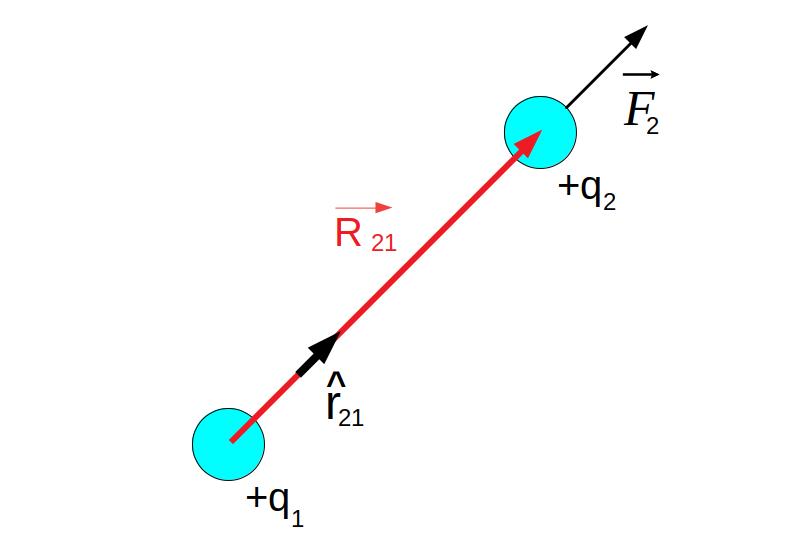
magnitude of (force on particle 2 by particle 1)

So now we will calculate Electrostatic Force vectorially.

(1.7)

(1.8)

Let coordinate of be and coordinate of  be then



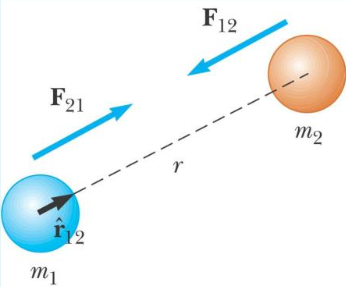


Fig 2-3 Electrostatic Force

* + 1. **Force fields**

A force field is a region in space where an object with a property, such as mass or charge, will experience a force. In physics, force fields are conceptual tools used to describe the influence a particular object (or objects) has on the space around it, affecting other objects within that region.

It could be for both gravitational and electrostatic.

* 1. **Acceleration, Velocity, Speed, Displacement**

(1.9)

Acceleration- It is the measure of how quickly the velocity of an object is changing OR it is the rate of change of velocity with respect to time.

(1.10)

But we will ignore finding acceleration of particles by this method. Instead, we will use the formula below: -

(1.11)

Velocity- rate of change of position with respect to time. (vectorially)

Displacement- vector quantity that represents change in position from starting of time.

Relation among velocity, acceleration and displacement is well explained by 3 Newtonian equations of motion:-

(1.14)

(1.13)

(1.12)

Where, acceleration

final velocity

initial velocity

displacement

time

mass of particle

But we are dealing with direction of particle along with their magnitude. This fact makes it important to deal with these equation vectorially.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | (1.16)  (1.15) |
|  |  |  | (1.17) |
|  |  |  |  |

Where, components of

components of

components of

components of

Now whenever net values are to be evaluated, we can use following formulas:-

(1.18)

(1.18)

Speed- it is nothing but scalar form of velocity OR it is magnitude of velocity.

(1.21)

(1.20)

(1.19)

(1.22)

* 1. **Linear and Angular Momentum, KE, PE, Torque**

Linear Momentum- It is a vector physical quantity with direction same that of velocity and magnitude equal to product of mass and velocity of particle.

(1.24)

(1.23)

Where, linear momentum

mass of particle

components of linear momentum

speed of particle

Angular Momentum- It is cross product of linear momentum and position vector of particle from the point.

(1.25)

Kinetic Energy (KE)- It is energy which a particle posse due to its motion. It is a scalar quantity.

Where, KE= Kinetic Energy

(1.26)

speed

Electrostatic Potential Energy (EPE)- Electrostatic potential energy is the energy associated with the arrangement of electric charges in an electric field. Below is the formula for potential energy due to system of 2 charges.

(1.27)

With n number of particles formula for total EPE is: -

(1.28)

Where, coulomb’s constant

distance between particle i and j

charge of jth particle

Gravitational Potential Energy (GPE)- Gravitational potential energy is the energy associated with the arrangement of electric charges in an electric field. Below is the formula for potential energy due to system of 2 charges.

(1.29)

With n number of particles formula for total EPE is: -

(1.30)

Were, gravitational constant

distance between particle i and j

mass of jth particle

Torque- It is a vector quantity which measures the tendence of a force to rotate an object about an axis or pivot point. Its formula is: -

(1.31)

# 

# CHAPTER 3

**ALGORITHM AND LITERATURE SURVEY**

# CHAPTER 4

**SOFTWARE DESIGN**

This section should aim at experimental designs, materials used. Methodology shouldbe mentioned in details including modifications if any.

**4.1 Design Approach**

A design approach will guide you to achieve the overall goal of the design. The key to design approach is clear understanding of what you want to achieve. The basic idea of the design approach is to understand the context in and the constraints under which a design solution will be produced.

For finding an appropriate design approach you need to:

* Investigate possibilities and constraints
* Define problem spaces
* Build and redefine the specifications of design solutions to test the ideas in a real world context
* Prototype/Simulate possible scenarios that can incrementally or significantly improve the inherited situation
* Understanding the current style and trend

# CHAPTER 5

**RESULTS AND DISCUSSION**

An integrated results analysis is crucial for a project. Student with his insight and understanding of the goals, strategies, environments, and challenges of the project can analyze and put the results in context. While presenting the results, write at length about the various statistical tools used in the data interpretation. The result interpretation should be simple but full of data and statistical analysis. This data interpretation should be congruence with the written objectives and the inferences should be drawn on data and not on impression. Avoid writing straight forward conclusion result; it should lead to generalization of data on the chosen sample.

The integrated results analysis should satisfy the following guidelines.

* It should be relevant and significant
* It should be comparable to the existing references.
* It should be presented in a clear and understandable format.
* focus on results and achievements
* compare planned to actual results
* describe variations and uncertainties
* include simulation and experimentation results
* if analysis is made under any assumptions, they should be clearly described.

**3.1 Discussion of results**

The purpose of Discussion is to interpret the results in light of what was already known about the topic of the Project, and to explain new understanding of the problem after taking the results into consideration. It should discuss the implications of those results.

The Discussion will always connect to the Introduction, but it does not simply repeat or rearrange the Introduction. Instead, it tells how the study has moved forward from the place it left, at the end of the Introduction.

It can include:

* What can be the next step in the projects, e.g., what experiments would you do next?
* Organize the Discussion to address each of the experiments/studies for which results were presented.
* Consider how the results of others studies may be combined to derive a new or perhaps better substantiated understanding of the project.
* In writing this section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books.

**3.1.1 Subsection (times new roman 12)**

Normal text

# CHAPTER N

**CONCLUTION & FUTURE SCOPE OF THE WORK**

A conclusion should be the final section in which the outcome of the work is mentioned briefly. Check that your work answers the following questions:

* Did the research project meet its aims (check back to introduction for stated aims)?
* What are the main findings of the research?
* Are there any recommendations?

In the chapter, students are supposed to write conclusion about the project and what is the future scope of this project

State the aspects of the problem that have not been considered and possibilities for further enhancements. This section shows how the work done can set new research directions. If you're actively engaged in follow-up work or plan to pursue further work on the subject, mention that.

**N.1 Section in the Chapter**

Normal text

**N.1.1 Subsection**

Normal text

**REFERENCES**