A Course Based Project Report on

VNRVJIET MAP

Submitted to the

Department of Electronics and Instrumentation

In partial fulfilment of the requirements for the completion of the course

DATA STRUCTURES LABORATORY (22ES2CS102)

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND INSTRUMENTATION ENGINEERING

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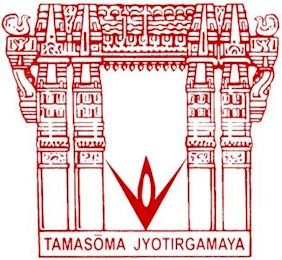
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DEPATMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

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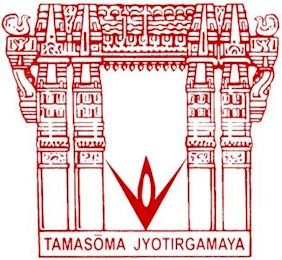
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**CERTIFICATE**

This is to certify that the course based project report entitled “ VNRVJIET MAP “ is a bonafide work done under our supervision and is being submitted by Ms. Sohana Seethala(23071A10C0), Mr. Shanigarapu Teja(23071A10C1), Ms. Sharmila Reddy Male(23071A10C2), Ms. Sowmya Lakshmi Tayyala(23071A10C3),Mr. Sreeneer Reddy Uppaluru(23071A10C4) in partial fulfilment of the award of the degree of Bachelor of Technology in Electronics and Instrumentation Engineering , of the VNRVJIET, Hyderabad during the academic year 2023-2024.

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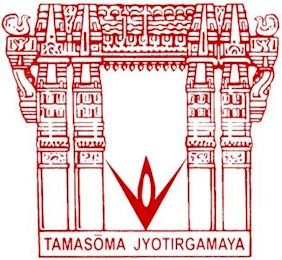
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**DECLARATION**

We declare that the course based project work entitled “ VNRVJIET MAP “ submitted in the Department of Electronics and Instrumentation Engineering , Vallurupalli Nageswara Rao Institute of Engineering and Technology, Hyderabad, in partial fulfilment of the requirement for the award of the degree of Bachelor of Technology in Electronics and Instrumentation Engineering is a bonafide record of our own work carried out under the supervision of Dr.K.Sravanthi , Assistant Professor, Department of IT, VNRVJIET. Also, we declare that the matter embodied in this thesis has not been submitted by us in full or in any part thereof for the award of any degree /diploma of any other institute or university previously.

Date: 21-6-2024

Place: Hyderabad.

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**ACKNOWLEDGEMENT**

We express our deep sense of gratitude to our beloved President, Sri D Suresh Babu , VNR Vignana Jyothi Institute of Engineering and Technology for the valuable guidance and for permitting us to carry out this project.

With immense pleasure, we record our deep sense of gratitude to our beloved Principal, Dr. C.D.Naidu, for permitting us to carry out this project.

We express our deep sense of gratitude to our beloved Professor , Dr. R. Manjula Sri, Professor and Head , Department of Electronics and Instrumentation Engineering, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad – 500090 for the valuable guidance and suggestions, keen interest and thorough encouragement extended throughout the period of project work.

We take immense pleasure to express our deep sense of gratitude to our beloved Guide, **Dr. K Sravanthi ,** Assistant Professor in Information Technology, VNR Vignana Jyothi Institute of Engineering and Technology , Hyderabad for her valuable suggestions and rare insights , for the constant source of encouragement and inspiration throughout my project work.

We express our thanks to all those who contributed for the successful completion of our project work.

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**ABSTRACT**

This project focuses on developing a digital map representation of a college campus using graph data structure concepts in the C programming language. The primary goal was to create a scalable and efficient system to model and navigate through various key locations within the college. The specific locations chosen for this project include the Main Gate, PEB Block, PEB Canteen, Coca Cola Canteen, C Block, B Block, A Block, D Block, and PG Block, each represented as vertices in the graph.

The project utilized an adjacency list representation for the graph, which is suitable for sparse graphs where not all pairs of vertices are connected. Key functionalities included defining the graph structure, adding edges to represent connections between locations, and implementing methods to print the adjacency list representation of the graph.

Through this project, we aimed to demonstrate the application of fundamental data structures and algorithms in a real-world scenario, enabling efficient pathfinding and navigation strategies within the college campus. The resulting digital map provides a foundational tool for future enhancements, such as integrating graph traversal algorithms for automated route planning or implementing a graphical user interface (GUI) for user interaction.

**TABLE OF CONTENTS**

|  |  |
| --- | --- |
| **CONTENTS** | **Pg No.** |
| ABSTRACT | 5 |
| INTRODUCTION | 7-8 |
| SOURCE CODE | 9-12 |
| OUTPUT | 13 |
| CONCLUSIONS | 14 |
| REFERENCES | 15 |

**Chapter-1**

**INTRODUCTION**

* 1. **Problem Definition**

This project focuses on developing a digital map representation of a college campus using graph data structure concepts in the C programming language. The primary goal was to create a scalable and efficient system to model and navigate through various key locations within the college. The specific locations chosen for this project include the Main Gate, PEB Block, PEB Canteen, Coca Cola Canteen, C Block, B Block, A Block, D Block, and PG Block, each represented as vertices in the graph.

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* 1. **Objective**

The primary objective of this project is to design and implement a comprehensive digital mapping system for a college campus using graph data structures in the C programming language. The system aims to accurately model and manage key locations within the campus, including the Main Gate, PEB Block, PEB Canteen, Coca Cola Canteen, C Block, B Block, A Block, D Block, and PG Block. Utilizing an adjacency list representation, the project intends to establish efficient connections (edges) between these locations, enabling effective pathfinding and navigation functionalities. Specific goals include developing algorithms for adding, removing, and modifying connections based on campus layout updates, ensuring the system's scalability and adaptability.

Additionally, the project aims to integrate basic pathfinding algorithms such as Breadth-First Search (BFS) or Depth-First Search (DFS) to facilitate optimal route planning between any two locations on the map. Documentation will be comprehensive, detailing the rationale behind design decisions, implementation specifics, testing methodologies, and performance evaluations. The project's ultimate aim is to showcase the practical application of graph theory in creating robust, interactive digital maps tailored for educational institutions, enhancing campus navigation and operational efficiency.

**Chapter-2**

**SOURCE CODE**

#include <stdio.h>

#include <stdlib.h>

// Enum to represent locations in the college

enum Locations {

MAIN\_GATE,

PEB\_BLOCK,

PEB\_CANTEEN,

COCA\_COLA\_CANTEEN,

C\_BLOCK,

B\_BLOCK,

A\_BLOCK,

D\_BLOCK,

PG\_BLOCK,

NUM\_LOCATIONS // Number of locations in the college

};

// Structure for a node in adjacency list

struct AdjListNode {

int dest; // Destination vertex

struct AdjListNode\* next; // Pointer to next node

};

// Structure for adjacency list

struct AdjList {

struct AdjListNode\* head; // Head pointer of the list

};

// Structure for graph

struct Graph {

int V; // Number of vertices

struct AdjList\* array; // Array of adjacency lists

};

// Function to create a new adjacency list node

struct AdjListNode\* newAdjListNode(int dest) {

struct AdjListNode\* newNode = (struct AdjListNode\*) malloc(sizeof(struct AdjListNode));

newNode->dest = dest;

newNode->next = NULL;

return newNode;

}

// Function to create a graph with V vertices

struct Graph\* createGraph(int V) {

struct Graph\* graph = (struct Graph\*) malloc(sizeof(struct Graph));

graph->V = V;

// Allocate memory for adjacency list array

graph->array = (struct AdjList\*) malloc(V \* sizeof(struct AdjList));

// Initialize each adjacency list as empty by default

for (int i = 0; i < V; ++i) {

graph->array[i].head = NULL;

}

return graph;

}

// Function to add an edge to an undirected graph

void addEdge(struct Graph\* graph, int src, int dest) {

// Add an edge from src to dest

struct AdjListNode\* newNode = newAdjListNode(dest);

newNode->next = graph->array[src].head;

graph->array[src].head = newNode;

// Since graph is undirected, add an edge from dest to src also

newNode = newAdjListNode(src);

newNode->next = graph->array[dest].head;

graph->array[dest].head = newNode;

}

// Function to print the adjacency list representation of the graph

void printGraph(struct Graph\* graph) {

const char\* locationNames[] = {

"Main Gate", "PEB Block", "PEB Canteen", "Coca Cola Canteen",

"C Block", "B Block", "A Block", "D Block", "PG Block"

};

for (int v = 0; v < graph->V; ++v) {

struct AdjListNode\* crawl = graph->array[v].head;

printf("Adjacency list of vertex %d (%s):\n", v, locationNames[v]);

printf("head");

while (crawl) {

printf(" -> %d (%s)", crawl->dest, locationNames[crawl->dest]);

crawl = crawl->next;

}

printf("\n");

}

}

int main() {

int V = NUM\_LOCATIONS; // Number of vertices (locations in the college)

struct Graph\* graph = createGraph(V);

// Adding edges to represent connections between locations

addEdge(graph, MAIN\_GATE, PEB\_BLOCK); // Main Gate <-> PEB Block

addEdge(graph, PEB\_BLOCK, PEB\_CANTEEN); // PEB Block <-> PEB Canteen

addEdge(graph, PEB\_BLOCK, C\_BLOCK); // PEB Block <-> C Block

addEdge(graph, PEB\_CANTEEN, COCA\_COLA\_CANTEEN); // PEB Canteen <-> Coca Cola Canteen

addEdge(graph, COCA\_COLA\_CANTEEN, C\_BLOCK); // Coca Cola Canteen <-> C Block

addEdge(graph, C\_BLOCK, B\_BLOCK); // C Block <-> B Block

addEdge(graph, B\_BLOCK, A\_BLOCK); // B Block <-> A Block

addEdge(graph, B\_BLOCK, D\_BLOCK); // B Block <-> D Block

addEdge(graph, A\_BLOCK, PG\_BLOCK); // A Block <-> PG Block

// Print adjacency list representation of the graph

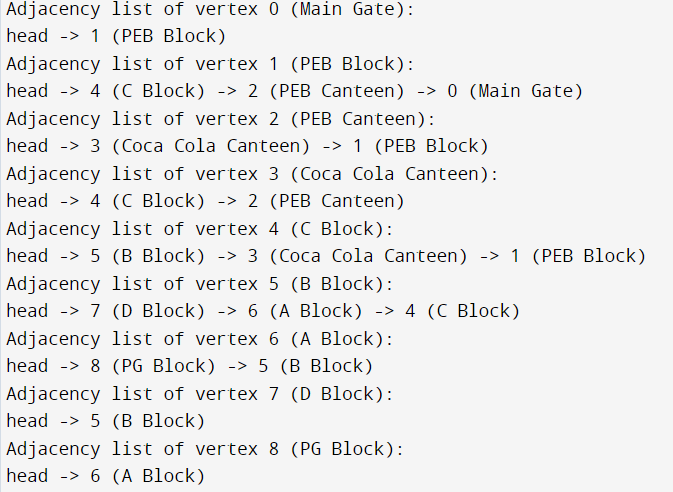
printGraph(graph);

return 0;

}

**Chapter – 3**

**OUTPUT**

****

**Chapter – 4**

**CONCLUSION**

In conclusion, the development of a digital college map using graph data structures in C has successfully addressed the need for an efficient and scalable navigation system within the campus environment. By accurately modeling key locations such as the Main Gate, PEB Block, PEB Canteen, Coca Cola Canteen, C Block, B Block, A Block, D Block, and PG Block using an adjacency list representation, the project has demonstrated the practical application of graph theory in digital mapping systems. The implementation of basic pathfinding algorithms has enabled users to navigate between any two locations effectively, enhancing overall accessibility and operational efficiency on campus. Documentation and reporting have provided comprehensive insights into the project's design decisions, implementation details, and performance evaluations, laying a solid foundation for future enhancements and optimizations. This project underscores the significance of computational algorithms in real-world applications, particularly in educational settings where efficient navigation is crucial for students, faculty, and visitors alike.

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