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Implementation of Dijkstra's Algorithm for Traffic Flow in Smart City using Raspberry Pi Board

Miss. Mayuri R. Namade[1], Miss. Sonali M Mhamane[2], Miss. Ashwini C. Waghmode[3], Prof. A. B. Chaunde[4]
Students, Department of Electronics[1,2,3]
Guide, Department of Electronics[4]
SVERI's College of Engineering, Pandharpur, India

Abstract: *Today, Traffic congestion Problems are avoid less in road network application such as in smart cities. The traffic density in a city changes from time to time sometimes there are increases huge amount of traffic and sometimes there are very minimum amount of traffic density also traffic profiles describe the time needed to pass the road based on time which also differs for work days and weekend. So it is very difficult to choose shortest time route form source to destination. The basic idea behind this is the implementation of one efficient method which is helpful for smooth and faster traffic flow in smart cities. Now a day's traffic congestion is the biggest problem in smart cities. Proposed system creates data base based on history of traffic conditions and find where traffic density is high according to time, day and date. Major role to the people live in various states, cities, town and villages, from each and every day they travel to work, to schools, to business meetings, and to transport their goods. Even in this modern era whole world used roads, remain one of the most useful mediums used most frequently for transportation and travel. The manipulation of shortest paths between various locations appears to be a major problem in the road networks. The large range of applications and product was introduced to solve or overcome the difficulties by developing different shortest path algorithms. Even now the problem still exists to find the shortest path for road networks. Shortest Path problems are inevitable in road network applications such as city emergency handling and drive guiding system. Basic concepts of network analysis in connection with traffic issues are explored. The traffic condition among a city changes from time to time and there are usually huge amounts of requests occur, it needs to find the solution quickly.*

Keywords: Road Network, Route Planning, Shortest Roads Play a Path, Raspberry Pi, Dijkstra Algorithm.

I. INTRODUCTION

The nature of human being is always finds the shortest path for travelling one place to another place which is required minimum travelling time The purpose of the shortest path is to save our valuable time. By selecting a particular shortest path we can reach faster at destination. . But only choosing shortest path is not sufficient for decreases travelling time. There are different methods are proposed by researches to deal with complex issue of route selection.As population increases in urban areas, traffic also become congested, this traffic congestion is the reason for taking maximum time for reach one place to another place.Dense traffic flow a like congestion problems which are highly slump the quality of existence. Following word describe the new algorithm that is Probabilistic Extension of Dijkstra's Algorithm in mandate to simulate real situations in which the shortest time path is every time not chosen.This approach in closes to transformation on the route that Dijkstra's Algorithm compute the path with unfixed distance in edges.In order to improve the efficiency of road network route of the planning, many experts and scholars have conducted some of studies, Dijkstra's algorithm is a research hotpot. The Dijkstra's algorithm has its own shortcomings when seeking an optimal path between two points, but it has irreplaceable advantages. Through the analysis of strengths and weaknesses of the classic Dijkstra's algorithm,we can find that the main drawbacks can be summarized as two points storage structure and searching area. Here proposed system method to make route the planning to target customer locations in order to get the most efficient time and minimum fuel consumption. We propose the use of Dijkstra Algorithm for shortest path algorithm to be implemented to the software for optimum result. The remaining paper is organized as follows. Algorithm information has been review in section 1.INTRODUCTION 2.Proposed System 3. Implementation and results are

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discussed in Section 4. System Architecture is discussed in section 5. Conclusion 6.Reference.

II. DIJKSTRA'S ALGORITHM

Dijkstra's algorithm to solve the shortest path problem (SPP)Is a very well-known algorithm In traffic situations,for example, the driver may not know the exact distance of the path or the shortest path to follow.In Dijkstra's Algorithm efficiently feeds an good path for moving from a source point to a destination point in a weighted graph. Bet when a driver forecast a path to imitate in an actual situation, we propose a traffic factor based on time function, we consider traffic condition according to time, date and day for finding minimum weight between road network, which is implemented to the Dijkstra algorithm calculation.This becomes an enhanced method on using the algorithm for real business condition, especially for traffic dependent network in Smart cities.

2.1 Probabilistic Extension of Dijkstra's Algorithm

In Probabilistic Extension of Dijkstra's Algorithm is efficiently feeds an good path for moving from a source point to a destination point in a weighted graph. Bet when a driver forecast a path to imitate in an actual situation, we propose a traffic factor based on time function, we Consider traffic condition according to time, date and day for finding minimum weight between road network, which is implemented to the Dijkstra algorithm calculation. This becomes an enhanced method on using the algorithm for real business condition, especially for traffic dependent network in Smart cities.

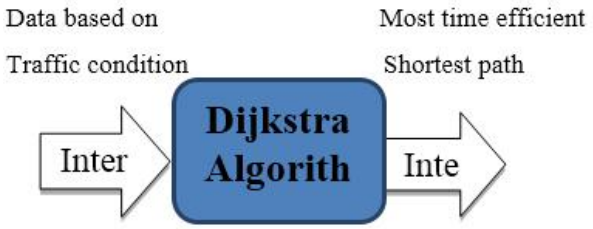

Figure .1.1.shows the Probabilistic Extension of Dijkstra

Algorithm consider all possibility which is used for finding shortest path as well as shortest time. To Implement the Probabilistic Extension of Dijkstra Algorithm it will be need to apply all possibilities for finding exact the traffic condition of each road between nodes, which is define how much time required for pass the source to destination.

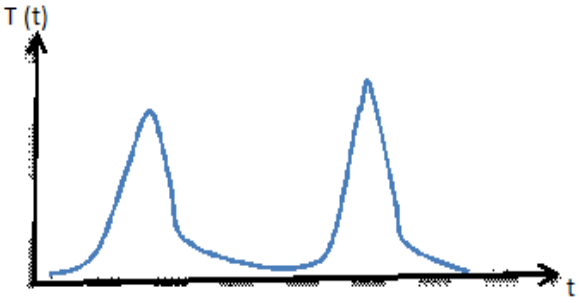

Fig 1.2 Traffic Graph for time base

III. PROPOSED SYSTEM

System consists of raspberry pi board, power supply, and display shown in figure. Power supply is the inputs to the raspberry pi board for turn on the board and display is the output to the raspberry pi board.

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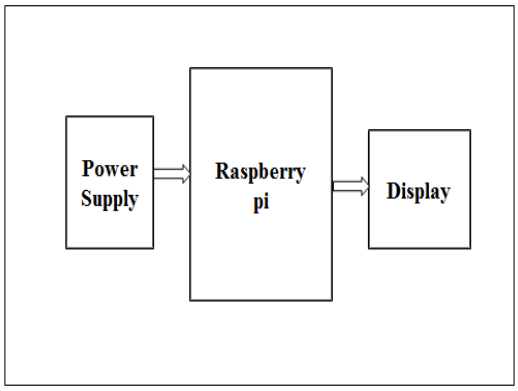

Figure 1.3 Block diagram of proposed system

3.1 Raspberry pi

In this section we provide a description of how to Dijkstra algorithm implement on raspberry Pi. Here we use Python programming language and Raspbian operating system, there have multiple operating systems for raspberry Pi but here we use Raspbian operating system. As shown in figure 4, it also have one audio output, four USB connector, forty pin General purpose input output connector, one display serial interface and one High Definition Multimedia Interface.

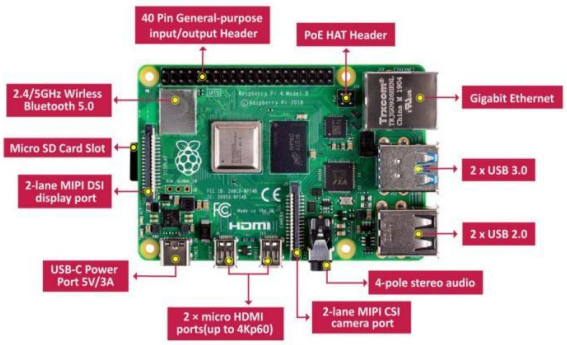

Fig. 1.4. Raspberry pi 2 board.

3.2 Display

The display module integrates the LCD display with a Conversion board that should be plugged into the Raspberry Pi through the display connector. Be aware that the connector is the same as the camera connector. Here we used 7" inch raspberry pi supported LCD. In fig 4 shown the how to LCD display connect with raspberry pi.

Fig 1.5 Front view display

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3.3 Power Supply

Raspberry pi required 5V micro U easily code readability in raspberry pi and its constructions allows developers to convey concepts in minimum lines of code also that would be feasible in other languages like as C, CPP or Java, VB. The language feeds to dispose intended to enable coherent code on both scale a small and large. Python is support for all operating systems such as windows, Linux, UNIX, Python program can be packaged into stand alone executable the programs for some of the most popular operating

3.4 Experimental Setup

On the behalf of setup required monitor to dispelling result. Monitor connected raspberry pi through HDMI (High-Definition- Multimedia Interface) to VGA (Video graphics adapter) cable. We can connect other LCD to raspberry pi through GPIO (General purpose input output) pins. Keyboard used for entering the name of source and destination. Keyboard and mouse connected raspberry pi through USB port raspberry pi have total four USB port. For power supply used mobile charger .Proposed system used python software for running algorithm code. Python is a widely used general-purpose, high-level programming language. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural.

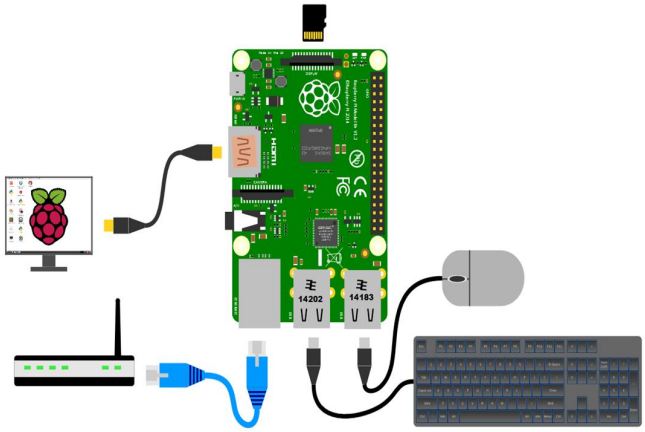

Fig 1.6 connection diagram

IV. IMPLEMENTATION AND RESULT

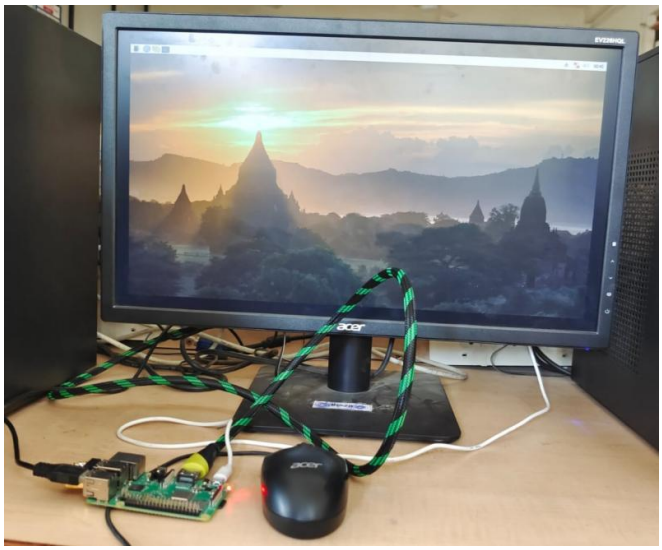

Fig 1.7 Experimental setup

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Proposed system used python software for running algorithm code.Probabilistic Extension of Dijkstra's Algorithm considers distance as well as delay occurred due to school, colleges, temple, offices, etc.In fig 8 shown result of Probabilistic Extension of Dijkstra's Algorithm which is consider all delay according to time and shown minimum weight age route. In fig 8 black colour words shows the name of source and destination and red colour box shows the shortest weight path.

V. SYSTEM ARCHITECTURE

This section presents the system architecture of our proposed system. First we discuss the system flow chart for the proposed system.

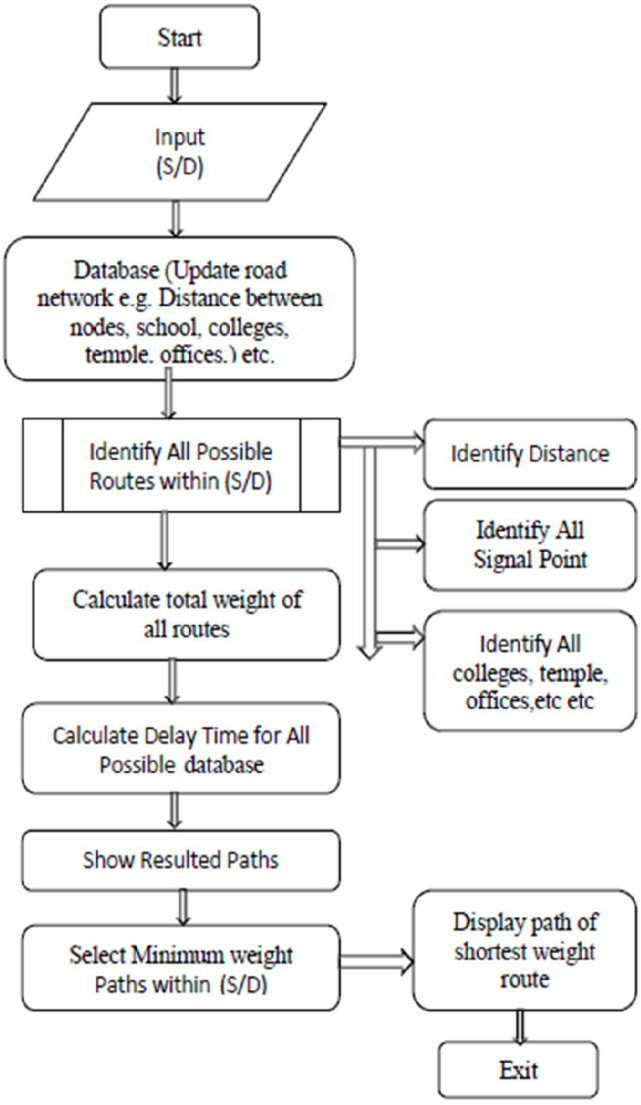

Fig. 1.9 Flow chart of Probabilistic Extension of Dijkstra's Algorithm

VI. CONCLUSION

This paper is based on advanced Dijkstra's algorithm. This is help for finding shortest weight path considers delay occurred due to school, colleges, temple, and offices, etc according to time, date and day. This system can find the Optimized route between source to destination. It is very difficult to recollect all thing for a human being in his busy life

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in Such scenario the system will advise a better route to the driver. In this system routing done on previous route database, it can be give better results for real the time route condition database. The Time base Weight for Dijkstra's Algorithm results will help in path planning activity,to get the more capability time, less number of fuel usages and cost, especially for traffic dependent network in smart cities. The weight of traffic condition derived from traffic profile data which dynamically affect the calculation based on time.

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