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Automatic Auto/Taxi Fare System

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***Abstract*- Taxis or auto rickshaws are an important part means of transportation. Integrating auto-rickshaw services complements public transportation systems, ensuring connectivity and easy access throughout the city. The current fare meter of auto-rickshaws and taxis follows a faring scheme that only computes the cost of the journey after the travel. This allows the drivers to trap new comers to a city to take passenger through a route that is longer than the exact route to his destined address leading to payment of fare which is larger than the actual fare. To eliminate this, a new system may be implemented that calculates the fare and route prior to the journey. Here GPS is used to determine the current location .The system uses a mapping scheme for calculating the shortest path from the current location to the destination and thereby computing the estimate of the fare for entire journey. As it gives an exact cost for the distance travelled, the conflicts between the driver and the passenger can be avoided**

Key words: **GPS, Dijkstra algorithm**

I. INTRODUCTION

Transportation is used for the movement of people, animals, and other things. Each mode of transport has a fundamentally different technological solution, and some require a separate environment. Each mode has its own infrastructure, vehicles, and operations, and often has unique regulations.

A road is an identifiable route of travel. The most common road vehicle is the automobile, a wheeled passenger vehicle that carries its own motor. The users of roads include motorcars, motorcycles, buses, trucks, bicycles auto rickshaw/ taxi and pedestrians.

Auto rickshaws are used in cities and towns for short distances. They are less suited to long distances because they are slow. Auto rickshaws provide cheap and efficient transportation. Modern auto rickshaws run on compressed natural gas (CNG) and are environmentally friendly. A large number of people use this as a means of their daily commute. But even though it is very useful, it is avoided by many. Since many times they are duped to pay extra amount as fare, as there is no means to verify if the route taken by the driver was the shortest available. Thereby to check if the reading of the meter is at least equivalent to the best minimum fare available to the required destination.

To avoid contention between driver and passenger due to over charged meter fare, the fare of the journey is computed/estimated prior to the journey. The work in this paper is accomplished by preparing a mapping scheme for calculating the shortest path from the current location to the destination and thereby computing the estimate of the fare for entire journey.

II. LITERATURE SURVEY

At present the auto rickshaw/taxi fare meter calculates the passenger fares based on distance travelled and waiting time. The existing system measures the mechanical rotation of the wheels and hence distances. As per the number of rotation the fare will be estimated. The mechanical setup connected to the measurement unit count the number of rotations of the wheel. The wheel rotation calculates the RPM and distance travelled by auto, this data will get recorded in a microcontroller and a receipt of appropriate fare is produced. The wheel size or diameter is also needed to be measured for distance measurement. The main part of this system is measurement Unit. This unit consists of microcontroller and the counter. Counter will send a pulse for each rotation to the microcontroller where microcontroller can receive maximum 15 pulses in a sec. The microcontroller then measures the distance by receiving the pulse from the counter. After fare calculation microcontroller sends the output to the display unit. The Programming plays a vital role here as measuring distance and calculating fare and subsequent condition is determined by programming. The display unit consists of LCD display panel. The fare will be increased from the minimum amount that is approved by the government.

Hardik Paschal in his work 'A Fair FARE System' [4] explains a circuit to be inbuilt in the existing meter and

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will send the count of wheel rotation on Bluetooth frequency with the help of Bluetooth modem. This data has to be received on the mobile of passenger after pairing their mobile with the Bluetooth device of the meter with the help of the meter id printed on the meter. The software in the mobile will calculate the fare amount on the basis of the data received by the meter. Passenger can cross check the fare amount between mobile reading and the meter reading. If there is difference then one can easily point out that there is tempering in meter. The draw of the system is with the limitations of Bluetooth.

III. DESIGN METHODOLOGY

In this paper a scheme is developed that uses the present location of the hired vehicle along with user specified destination data to compute the cost to travel from the current location to the intended destination. The new scheme is equipped with a GPS system and programmed in such a way that, it always provides the shortest path and guides the drivers through them. The current location is obtained by the GPS and is used as guide to find the next shortest point en route to the destination. After reaching each point the cost and travelled distance is calculated. This helps the customer to be assured that he is paying only for how much he needs to be. In regard to the cost, it is cheap and effective since a general purpose microcontroller and other easily replaceable parts are used. In case of any damage the driver can get the parts replaced easily compared to the currently used fare meters. Since an effective GPS module is used, which matches up with the speed of the travel it is also efficient and can prove to a reliable source to monitor the travel. Fig 1 shows the block diagram of Auto Fare System.

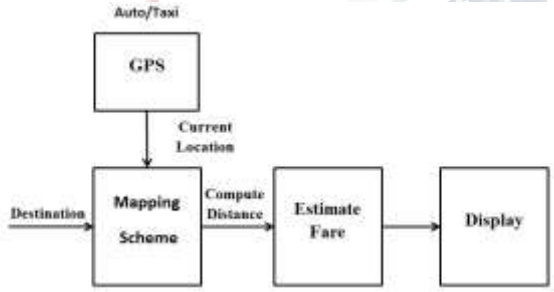

Fig 1 Present Auto fare system

Here the input is given as destination by using keypad, GPS track the current location and that will be submitted to the processor. Once the passenger gives the destination address it finds the shortest path and also computes the exact cost to the destined address using Dijkstra algorithm in the mapping scheme. If there are two are more routes to the destined address, Dijkstra algorithm finds shortest distance from source to destination. The way point for the shortest path will be displayed by the system by tracking the movement of the vehicle using GPS coordinates. The system also guides the driver and the passenger by showing next way point in the estimated shortest path. The estimated fare and total distance travelled is also displayed on the LCD display. This discourages driver who cheat passenger by taking passengers through a longer route than necessary.

The hardware components used are as follows:

The Arduino Duemilanove is a microcontroller board based on the ATmega168. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHzcrystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

IV. SOFTWARE IMPLEMENTATION

Flowchart:

First nodes are initialized. Let us consider A as a source node and give input D as destination address. To find out the shortest route from the source to destined address (A-D) Dijkstra algorithm is used. Dijkstra algorithm computes the shortest distance to the current and subsequent nodes. It finds out shortest distance among the several routes to the next location and this process will be continued until reaches the destination. It gives direction to the driver by checking shortest available path from current location to the next location. Fig 2(a) & 2(b) shows the flow chart for finding the shortest path using Dijkstra algorithm.

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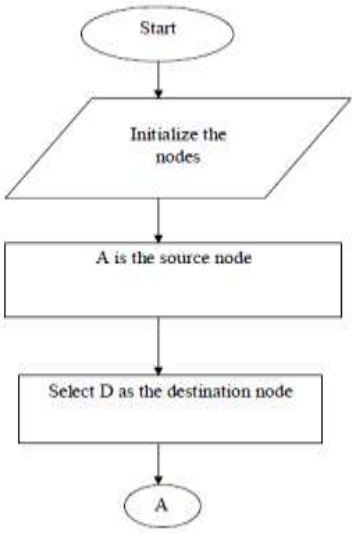


Fig 2 (a) flow chart

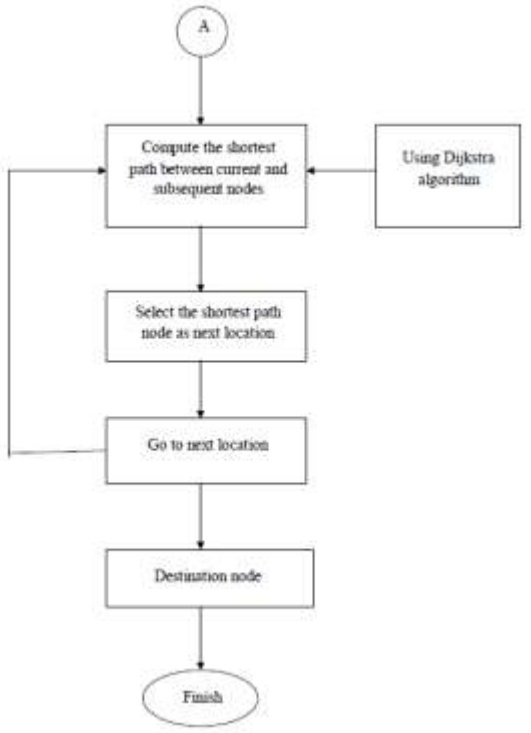


Fig 2 (b) Flow chart

V. RESULTS

This paper shows how the automatic taxi/ auto rickshaw fare system can be designed using Arduino board.

Fig 3: Connecting Arduino Duemilanove to the system through USB port.

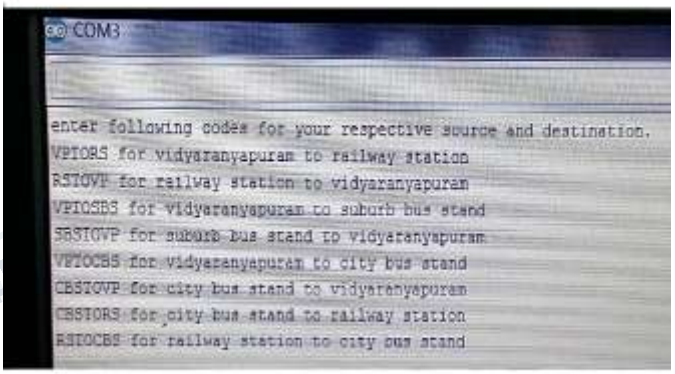
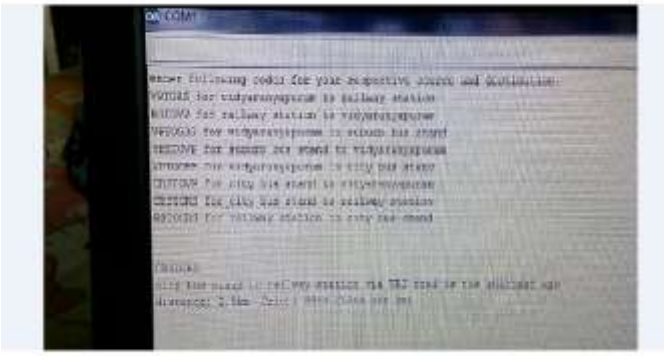


Fig 4: After uploading the program to the Arduino Duemilanove, the codes to be entered is listed for calculation.



the cost is estimated as follows. Eg: City bus stand to Railway station via URS road is the shortest way.

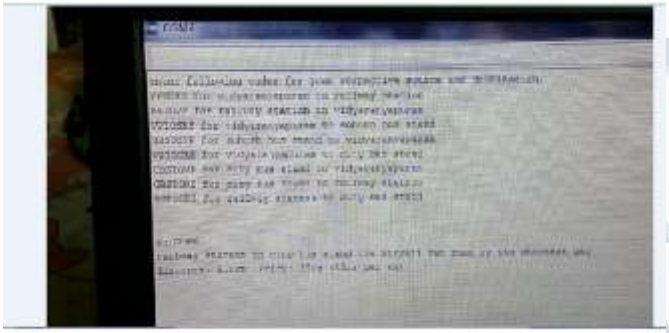


Fig 6: Railway station to City bus stand via Sayayaji Road is the shortest way.

VI. CONCLUSION & FUTURE SCOPE

By using this system, the conflicts between driver and the passenger will be avoided, as both will get to know the next location needed to take the passenger to the required destination. If the driver wishes to take a long route the system location doesn't match with his current location and he will be forced to take the described path. Hence the passengers can safely travel at any time.

In future, the current location can be manually entered into the system; from this passenger can be able to enter the source address also. Also LCD display can also be implemented by displaying the map to the source and destination address. This will be very useful for both driver and passenger to get view of the shortest path. It can also be implemented in multi-language. To reduce the size and for more features higher version microcontroller can be used.

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