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GPS AND GSM BASED SMART TAXIMETER

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Abstract:

The GPS technology can be used in order to protect citizens from overpaying. Traditional Taxi Fare-o-meter was based on optical transducer. But due to timer differences in the measurement module and controller the readings were not accurate. Also Taxi owner can cheat easily like choosing longer route to earn more profit. To improve accuracy of the reading, and to avoid cheats, GPS is to be implemented in fare measurement. GPS will also help Cab owner to keep track of his cabs. GPS based taxi fare-o-meter can be used worldwide since GPS system has global scope.Consumer will also get extra benefits like SMS notifications and printed copy of bills.

Keywords:
GPS-Global Positioning System, GSM-Global System for Mobile Communication

Introduction:

Presently, fare-o-meters in taxis and auto rickshaws have a few shortcomings in them due to which the customer ends up spending excess money.The GSM and GPS based tracking system will also provide real time vehicle location. It will notify where the vehicle is located and for how long. The system uses Global Positioning Satellites to find the geographic position and time information. The vehicle has the system installed inside it, which has an "On Board Module". During motion of the vehicle, its real-time parameters such as location are notified by SMS.

The main aim of the project is to improve accuracy of the fare-o-meter and provide notification facility on GSM mobile phone. This proposed work is an attempt to

design a taxi-meter that uses the GPS to determine an accurate taxi fare based on the distance traversed and this information can be transmitted to a remote server using GSM modem.The purpose of this system provides the following features:

- Shortest path from source to destination
- Accurate fare based on the distance traversed
- Real time tracking
- Time to time updates through SMS with the help of GSM module.

Block Diagram:

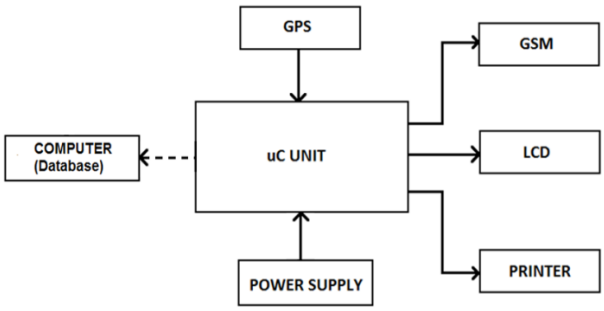


Fig : Block Diagram of Project

The above block diagram consists of the follwing blocks:

1) Microcontroller unit
2) GPS module
3) Power supply
4) GSM module
5) LCD display
6) Printer

The GPS receiver module tracks the traversed route from the source to destination and the data is sent to the microcontroller unit. The microcontroller will process the data and will display the Distance and the calculated Fare

accurately on a LCD. Using GSM module, customer will receive notification regarding bookings and other details. Printer is also to be used so that customer will get printed advice.

Hardware Part of the project:

1.Microcontroller (Atmega328) :

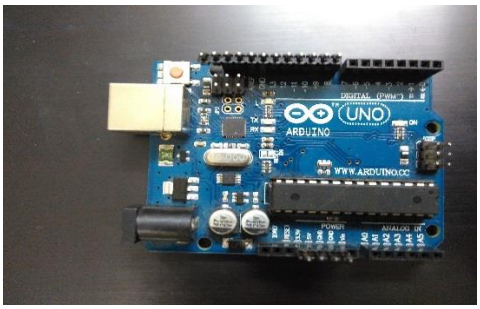


Fig : Arduino Uno(Atmega 328)

It has 14 digital input/output pins. Out of which 6 can be used for PWM signals, 6 analog inputs, and a 16 MHz crystal oscillator, a USB connection, a power jack, an UART and a reset button.

2.GPS Module:

GPS has become a widely deployed and useful tool for vehicle applying location and routes for cars and trucks to function without a human driver.

Fig : GPS module

- The hardware interface of GPS unit meets NMEA requirements.
- GPS sentences beginning with the following specifications: $GPGGA, $GPGSA, $GPGSV, $GPRMC, and $GPVTG. And sentences also begin with $GPMSS, $GPZDA

3.GSM module:

It is dual band GSM service works at 900 and 1800 MHz.

Fig : GSM Module SIM900A

- GSM Modules are used to transfer long-distance data extensively, reliably and accurately.
- It Supports instructions that use AT commands.

4.LCD Display 2*16 :

Fig : LCD Display (2*16)

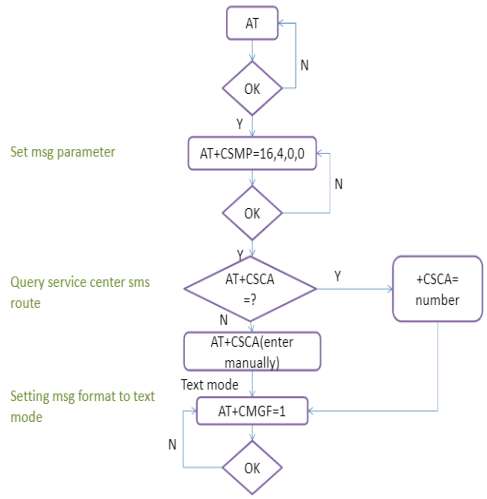
- A 16x2 LCD is used, it consists of two rows
- **16x2 LCD** can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix.

Software part of the project:

1.GSM Algorithm :

Sending Message :

1.1 Part I:



1.2 Part II :

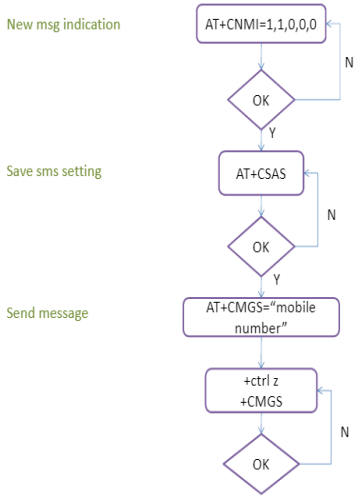


Fig :Message Sending Through GSM

Receiving Message :

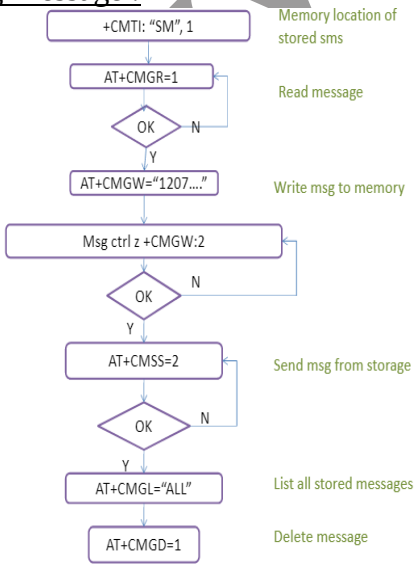


Fig :Message Receiving Through GSM

2. GPS Algorithm :

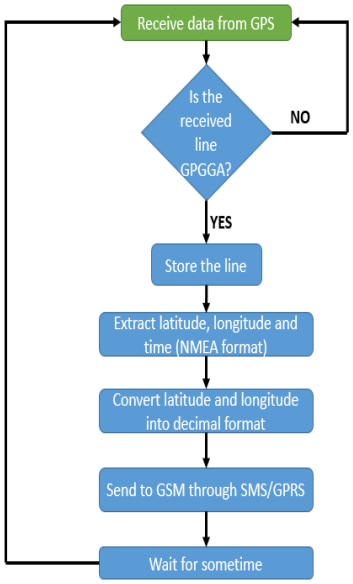


Fig : Algorithm For GPS Based Techology

Working Flow of the Project :

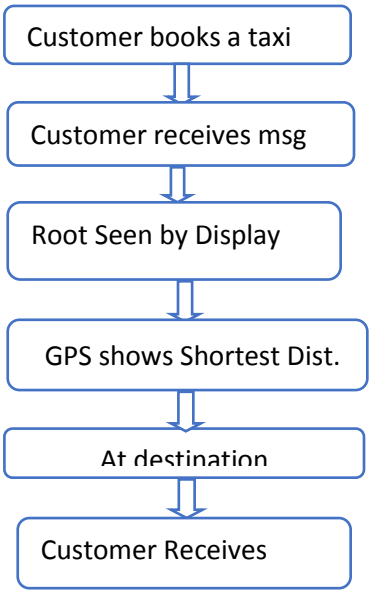


Fig :Flowchart of Working

Schematic Diagram :

1. GPS Schematics Diagram :

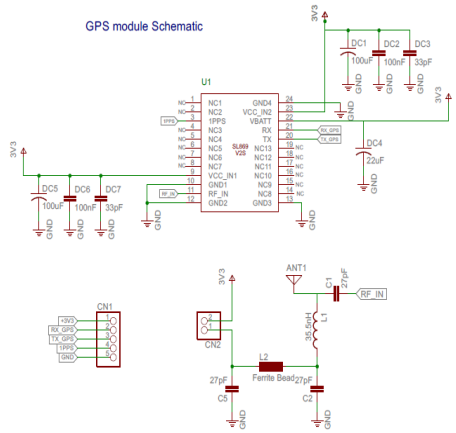


Fig : Schematics Diagram of GPS

2. GSM Schematics Diagram :

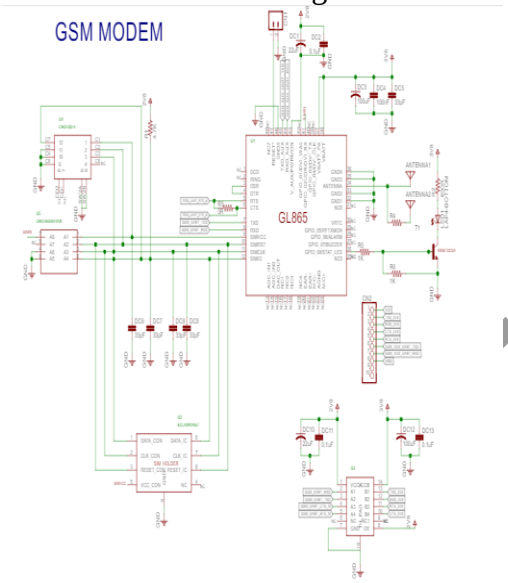


Fig : Schematics Diagram of GSM

Implimentation/Experimentation:

1] Interfacing of GPS with Microcontroller:

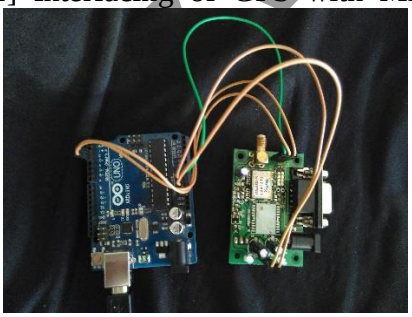


Fig : Interfacing of GPS with Controller

2] Interfacing of GSM with Microcontroller:

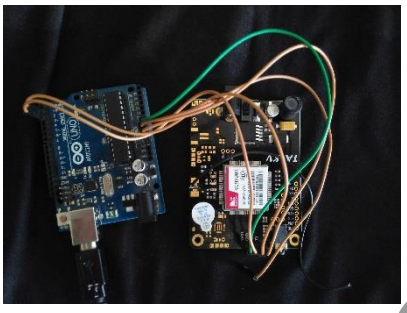


Fig : Interfacing of GSM with Controller

Results:

GSM is used for sending and receiving messages using AT commands like AT+CMGS, AT+CMGR, etc.

GPS is used in the project to calculate the latitude and longitude of every coordinate to which the taxi travels. The display incorporated in the system continuously displays the readings of GPS, and the RTC time, it also displays indications of sending and receiving messages, therefore the customer is fully aware of his travel details.

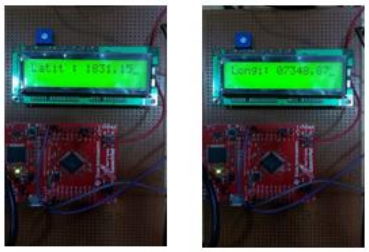


Fig : Actual output of the Project

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