DEVELOPING A VEHICLE TRACKING INTEGRATED MULTI SENSOR MODEL TO OPTIMIZE THE SUPPLY CHAIN LOGISTICS

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ABSTRACT

The paper is about vehicle tracking system. Generally, transport plays an important role in everyday life. The goods are carried from the warehouse to the market via road transport. This vehicle tracking system provides information on the current location using GPS and the elevation angle of the vehicle is measured using accelerometer. The distance and time required to reach the destination is calculated and if the distance and time is constantly increasing, then it is assumed that the vehicle did not reach the location and the vehicle gets locked by disabling the motors. The data is transmitted from the vehicle to the owner via GSM as an SMS. The data from GPS and accelerometer is fused by kalman filter to improve accuracy.

I. INTRODUCTION

An embedded framework is one sort of a PC framework basically intended to play out a few undertakings like to get to, procedure, store and furthermore to control the information in different hardware based frameworks. Implanted frameworks are a mix of equipment and programming where programming is normally known as firmware that is installed into the equipment. One of its most significant attributes of these frameworks is, it gives the yield inside as far as possible. Inserted frameworks backing to make the work increasingly impeccable and advantageous. Along these lines, every now and again inserted framework are utilized in straightforward and complex gadgets as well. The utilizations of implanted frameworks fundamentally include in our genuine for a few gadgets like microwave, number crunchers, TV remote control, home security and neighbourhood traffic control frameworks, and so on.The embedded system generally consists of sensors which transmit the data at real time basisand the transmitting module which transmits the data. The processor processes the data and follows the instruction in order to perform a particular task. Generally, a vehicle tracking system consist of a GPS receiver and a transmitting module with the receiver end. The receiver end may be a hand device like mobile phones or the webpages etc. The existing proposed system uses GPS and Accelerometer values directly.The proposed system fuses the data of the GPS and accelerometer values and stabilizes it using an algorithm and transmits the data via GSM.

II. COMPONENTS REQUIRED

The hardware components used are:

● GSM module

● Accelerometer

● GPS receiver module

● Arduino UNO

The software components used are:

● Arduino IDE

● MATLAB

A. GSM module GSM is a flexible correspondence modem;it speaks to overall structure for compact correspondence (GSM). The probability of GSM was made at Bell Laboratories in 1970. It is extensively used versatile correspondence system on the planet. GSM is an open and modernized cell development used for transmitting adaptable voice and data organizations works at the 850MHz, 900MHz, 1800MHz and 1900MHz repeat bands.GSM structure was made as a propelled system using time division various passage (TDMA) methodology for correspondence reason. A GSM digitizes and decreases the data, by then sends it down through a channel with two one of a kind surges of client data, each in its very own particular timetable opening. The propelled system has an ability to pass on 64 kbps to 120 Mbps of data rates.

TDMA strategy depends on relegating distinctive vacancies to every client on a similar recurrence. It can without much of a stretch adjust to information transmission and voice correspondence and can convey 64kbps to 120Mbps of information rate.

Fig.1:GSM Module

B. Accelerometer An accelerometer is a gadget that estimates speeding up. The speeding up because of gravity and the real estimation of the accelerometer is unique. Accelerometers have

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different applications in industry and science. Profoundly delicate accelerometers are segments of inertial route frameworks for flying machine and rockets. Accelerometers are utilized to recognize and screen vibration in turning apparatus. Accelerometers are utilized in tablet PCs and computerized cameras with the goal that pictures on screens are constantly shown upstanding. Accelerometers are utilized in automatons for flight adjustment. Facilitated accelerometers can be utilized to gauge contrasts in appropriate speeding up, especially gravity, over their partition in space; i.e., inclination of the gravitational field. This gravity radiometry is helpful on the grounds that outright gravity is a feeble impact and relies upon nearby thickness of the Earth which is very factor. Small scale machined miniaturized scale electromechanical frameworks (MEMS) accelerometers are progressively present in versatile electronic gadgets and computer game controllers, to identify the situation of the gadget or accommodate game info.
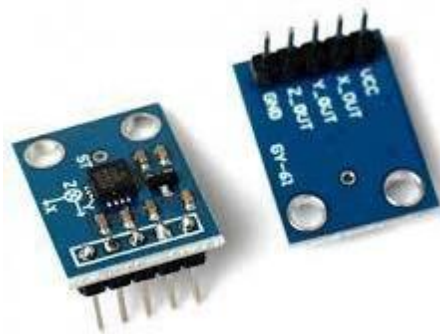

Fig.2: Accelerometer

C. GPS Receiver module A GPS route gadget, GPS collector, or basically GPS is a gadget that is equipped for accepting data from GPS satellites and after that to compute the gadget's topographical position. Utilizing appropriate programming, the gadget may show the situation on a guide, and it might offer headings. The Global Positioning System(GPS) is a worldwide route satellite system(GNSS) made up of a system of at least 24, yet as of now 30, satellites put into space by the U.S. Branch of Defense The GPS was initially produced for use by the United States military, yet during the 1980s, the United States government enabled the framework to be utilized for non military personnel purposes. In spite of the fact that the GPS satellite information is free and works anyplace on the planet, the GPS gadget and the related programming must be purchased or leased. A GPS gadget can recover from the GPS framework area and time data in every single climate condition, anyplace on or close to the Earth. A GPS gathering requires an unhampered observable pathway to at least four GPS satellites, [2]and is liable to poor satellite sign conditions. In especially poor sign conditions, for instance in urban regions, satellite sign may show multipath engendering where sign bob off structures, or are debilitated by meteorological conditions. Impeded viewable pathways may emerge from a tree shelter or inside a structure, for example, in a structure, carport or passage.

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Fig.3:GPS Module

D. Arduino UNO The Arduino Uno is a microcontroller board reliant on the ATmega328 (datasheet). It has 14 propelled information/yield pins (of which 6 can be used as PWM yields), 6 straightforward information sources, a 16 MHz valuable stone oscillator, a USB affiliation, a power jack, an ICSP header, and a reset catch. It contains everything expected to help the microcontroller; basically partner it to a PC with a USB connection or power it with an AC-to-DC connector or battery to start. The Uno fluctuates from each and every going before board in that it doesn't use the FTDI USB-to-successive driver chip. Or maybe, it incorporates the Atmega16U2 (Atmega8U2 up to adjustment R2) altered as a USB-to-consecutive converter.
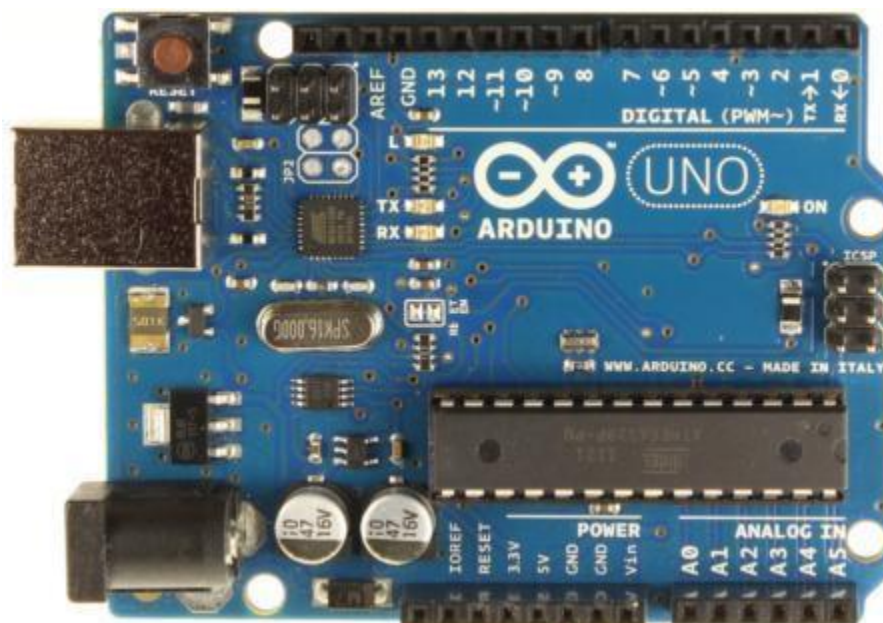

Fig.4: ARDUINO UNO

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Update 2 of the Uno board has a resistor annihilating the 8U2 HWB line to ground, making it less complex to put into DFU mode. Update 3 of the board has the going with new features:1.0 pinout: included SDA and SCL pins that are near the AREF stick and two other new sticks put near the RESET stick, the IOREF that empower the shields to change in accordance with the voltage gave from the board. In future, shields will be ideal both with the board that usage the AVR, which work with 5V and with the Arduino Due that work with 3.3V. The ensuing one is a not related stick, that is held for future purposes.

III. IMPLEMENTATION

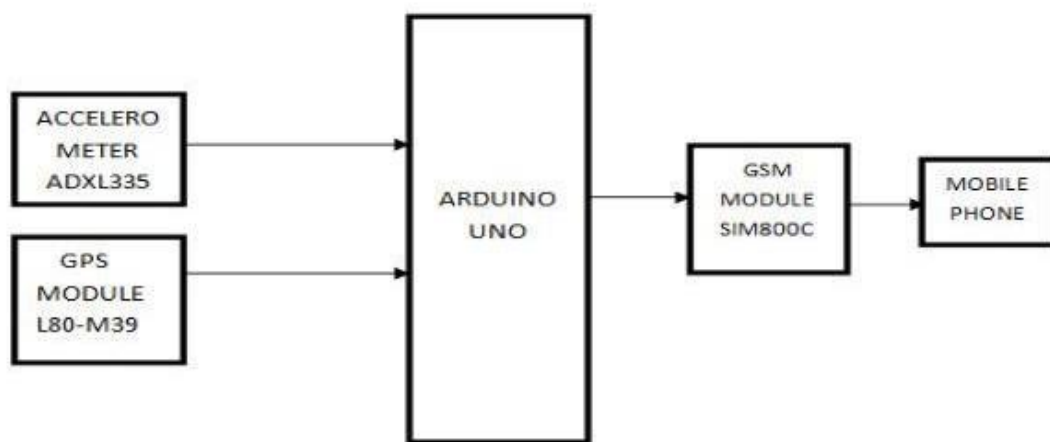The block diagram of the proposed system is given below.

Fig.5: The block diagram of the proposed system

The block diagram consists of GPS receiver and accelerometer whose data needs to be fused. The data is fused using kalman filter. The fused data is sent serially to the ARDUINO UNO which processes the data to the GSM module. The GSM Module sends a SMS every 30 seconds to the registered user with the latitude andlongitude values. Accident detection can also be indicated to the user if the elevation angle is detected to be in out of range.
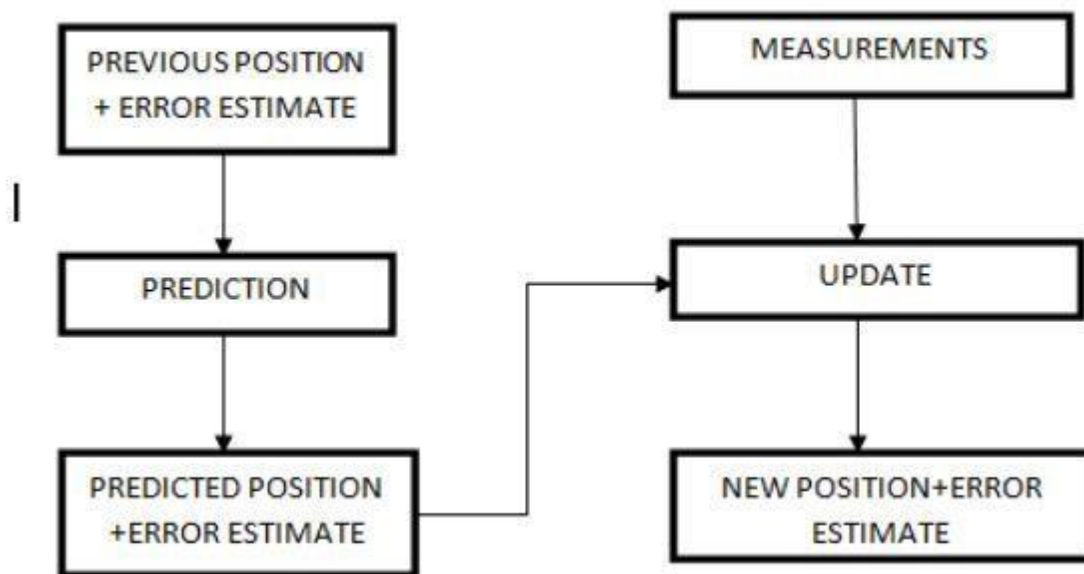
Fig.6:Kalman filter algorithm

The above figure is the flow chart of Kalman Filter algorithm.In insights and control hypothesis, Kalman separating, otherwise called direct quadratic estimation (LQE), is a calculation that uses a progression of estimations saw after some time, containing factual clamor and different mistakes, and creates appraisals of obscure factors that will in general be more exact than those dependent on a solitary estimation alone, by evaluating a joint likelihood appropriation over the factors for each time span. The Kalman channel has various applications in innovation. A typical application is for direction, route, and control of vehicles, especially flying machine and rocket. The computation works in a two-advance methodology. In the conjecture adventure, the Kalman channel produces evaluations of the present state factors, close by their vulnerabilities. At the point when the consequence of the accompanying estimation (basically contaminated with some proportion of screw up, including unpredictable tumult) is viewed, these examinations are revived using a weighted typical, with more weight being given to checks with higher affirmation. The computation is recursive. It can continue running logically, using only the present data estimations and the as of late decided state and its weakness network; no extra past information is required.

IV EXPERIMENT AND RESULT
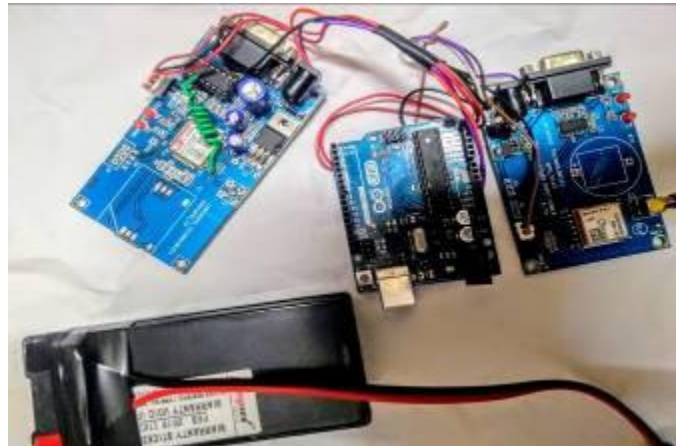
The working modelof the proposed system

The GPS receiver, accelerometer sensor and GSM module is connected to the ARDUINO board as shown in Fig 7 and the location is sent to the mobile phone as a SMS with specific location as shown in Fig 8. The alert message on accident along with the location of occurrence is also received as a SMS.

V. CONCLUSION AND FUTURE WORK

In this proposed system, GPS receiver and Accelerometer sensor are used to get the location of the vehicle and its elevation angle. The data is fused and sent it to ARDUINO UNO which processes the data and send it to GSM Module which sends it to the mobile phone of the owner. The future work includes the interfacing of camera with ARDUINO to capture the image of the person who is driving it.