Accident Indication System Based on GPS and Raspberry PI

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Abstract: Design of Vehicular monitoring and tracking system using RASPBERRY PI is proposed. The vehicular module is used to track, monitor, and surveillance and finds the accident spot and intimate to the monitoring station. The proposed design provides information regarding vehicle Identity, speed, and position on real time basis. This information are collected by the RASPBERRY PI by using different module and dispatch it to the monitoring station where it stores the information in database and display it on graphical user interface (GUI) that is user friendly. GUI is built on Microsoft Visual Studio 2010. This design provides information in real time using µc/OS-II.

Key words: RASPBERRY PI, GPS, GSM, Wireless monitoring station, µc/OS-II.

I. INTRODUCTION

In today's world as the population increases day by day the numbers of vehicles also increases on the roads and highways. This result in more accident that interns leads to the traffic jams and public get help instantaneously. This module provides information about the accident to the hospital and police station. As a result sudden help level of supervision and management for cargo transport vehicles, especially trucks carrying coal it is important to develop transport vehicles remote monitoring module .A server computer at the (remote) monitoring station that is continuously waiting for data from the system, should record the actions of the vehicle into a database. This contains the information regarding Vehicle velocity, position, identity and temperature in two fashions. The information given to monitoring station is in continuous manner and when the accident occurs. The development of vehicular design brings public many convenience in life but also brings many problems at the same time, for

example, traffic congestion, difficulty in monitoring dispersive vehicle, theft and other series of problems. We are intended to made this monitoring wireless using RASPBERRY PI hardware platform ported with real time operating system µc/OS-II.

II. SYSTEM DESIGN

Design is a creative process; a good design is the key to effective system. The system "Design" is defined as "The process of applying various techniques and principles for the purpose of defining a process or a system in sufficient detail to permit its physical realization". Various design features are followed to develop the system. The design specification describes the features of the system, the components or elements of the system and their appearance to end-users.
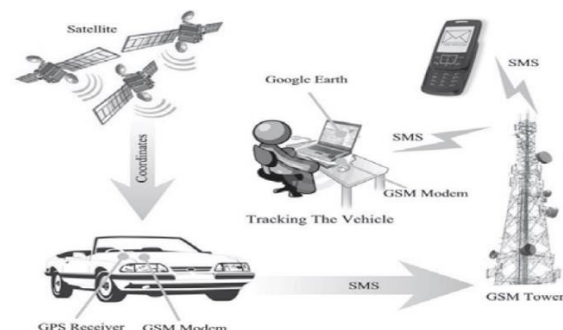

Fig: 2.1 Pictorial View

2.1   Input Design

The input Design is the process of converting the user-oriented inputs in to the computer- based format. The goal of designing input data is to make the automation as

easy and free from errors as possible. Providing a good input design for the application easy data input and selection features are adopted. The input design requirements such as user friendliness, consistent format and interactive dialogue for giving the right message and help for the user at right time are also considered for the development of the project. Input design is a part of overall system design which requires very careful attention. Often the collection of input data is the most expensive part of the system, which needs to be route through number of modules.

2.2   Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other systems through outputs. It is most important and direct source information to the user. Efficient and intelligent output improves the systems relationship with source and destination machine.
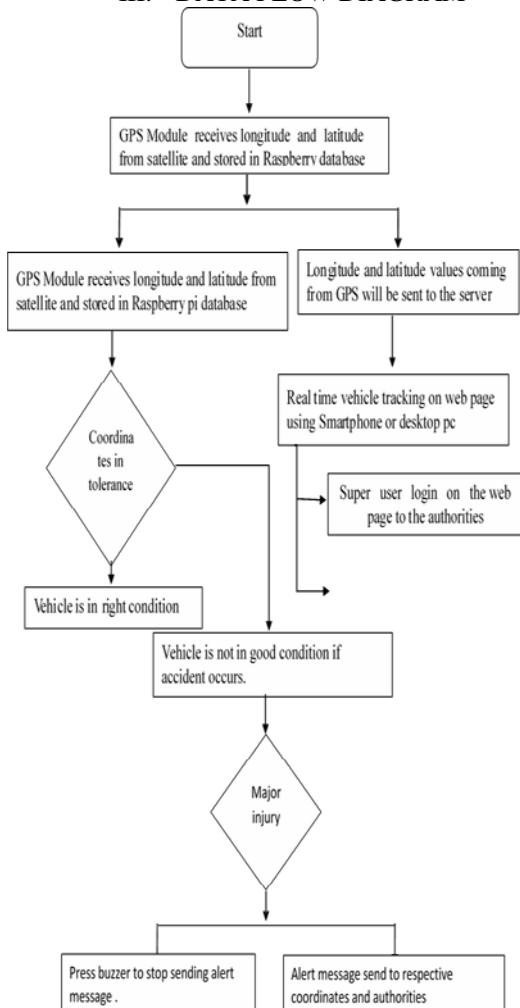
III.   DATA FLOW DIAGRAM

Fig 3.1 Data flow diagram

GPS module receives longitude and latitude from satellite and stored in Raspberry database. It tolerate the co-ordinates if vehicle is not in right condition (if accident occurs) alert message is sent to respective co-ordinates and authorities. The accident location is sent through GPS.

Emergency alert system

When the accident occurred, the accident sensor will get activated. If the user is not effected then he presses the buzzer, if he does not press the buzzer within 1min then message alert text reaches to the co-ordinates
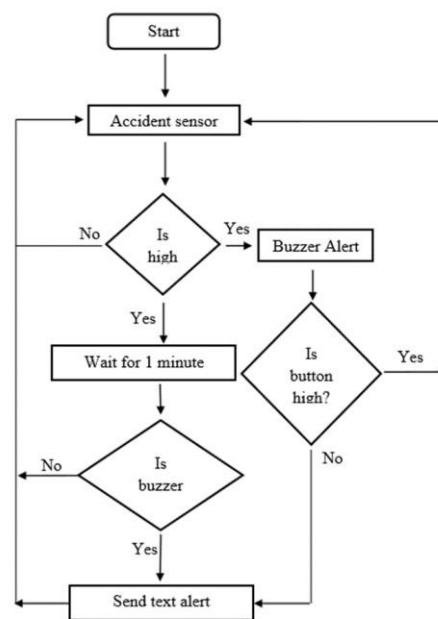

Fig 3.2 Working of emergency alert system

IV.   PREVIOUS WORK

This lacks in providing an effective user interface for communication from either end. Analysis report table lacks in updating data in real time. This does not provide security for various values recorded. Inefficient usage of SMS and the protocol provides no authorization, authentication and acknowledge for location and speed lock.

V.   PROPOSED METHODOLOGY

An advanced vehicle monitoring and tracking system is designed for monitoring the school vehicle from any location A to location B at real time and provide safety environment to the traveler.The present location can be locked and the system will alert the owner if the vehicle is moved from the present locked location. In addition, the speed can be locked and an alert message issued if

this speed is exceeded. A GPS based tracking system is proposed which keeps track of the location of a vehicle and its speed based on a mobile phone text messaging system, android application system, secure web login system and the system is able to provide real-time text alerts for speed and location.

VI.   IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in

achieving a successful new system and in giving the user, confidence that the new system will work and be effective. Implementation stage involves careful planning, investigation of existing system and its constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

6.1   Modules

Modules are the building blocks of any implementation. Modules include many components and their interfaces.

Construction of sensor network

Authorization to host data

Validating the Login

Locating and monitoring Vehicle

6.1.1   Construction of sensor network

In this module we are going to connect the network. A wireless sensor network is created from the raspberry pi to cloud and to the remote device.
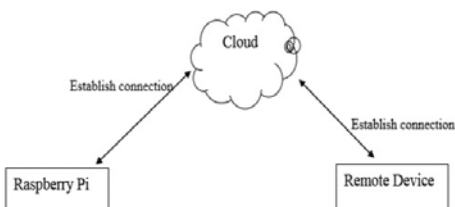

Fig 6.1 Raspberry pi & remote device communication

6.1.2 Authorization to host data

The gps coordinates that are received on to the vehicle is uploaded to cloud with public encryption and private access key
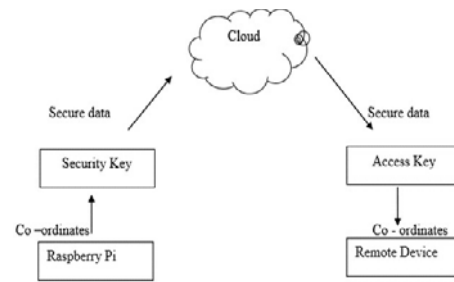

Fig 6.2 Data path of coordinates

5.1.3 Validating the Login

The authorized person log in using the authenticated credentials given, this login is validated with the raspberry pi server on board.
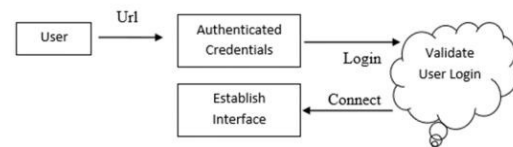

Fig 6.3 User Validation

6.1.4 Locating and monitoring Vehicle

The graphical interface designed leads to the tracking of the vehicle using the coordinates. The freely available google maps application program interface is used that maps the location of the vehicle to its coordinates received.
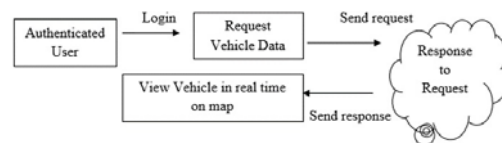

Fig 6.4 Locating Vehicle

VII.   EXPERIMENTAL RESULT

In computer systems, a snapshot is the state of a system at a particular point in time. The term was coined as an analogy to that in photography. It can refer to an actual copy of the state of a system or to a capability provided by certain systems.

i.   Receiving GPS Coordinates:

Fig 7.1 Receiving GPS Coordinates

Description: The following figure shows the coordinates received from gps receiver in command prompt using serial to USB connector. The following prompt is provided by putty application software.

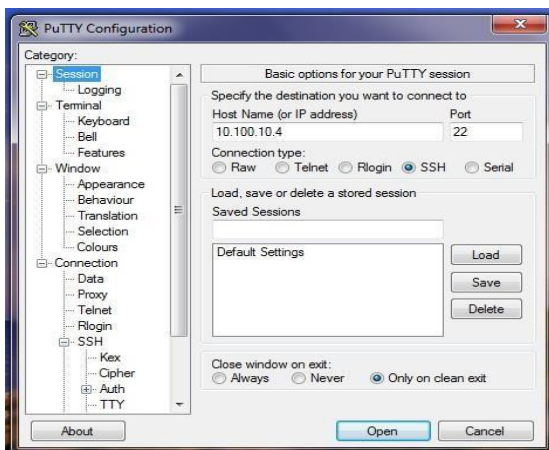ii. Establishing connection to raspberry pi:

Fig 7.2 Establishing connection to raspberry pi

Description: The following figure shows the establishment of LAN connection to raspberry pi using putty application software. 10.100.10.4 is the IP address of raspberry pi and its connected using port number 22. SSH connection is established.

ENABLING X11 forwarding for connection:

Description: The following figure shows enabling X11 forwarding to connect with raspberry pi. X11 forwarding can be useful when a GUI is required, especially for system and configuration tools that don't have a CLI interface. Here's how to set up and use X11 forwarding on raspberry pi using putty application software. These items allow the traffic to be forwarded over to your computer from the host and also allow forwarding to be used. X11 forwarding can be configured on a per user basis. There are additional options that can be configured for X11 forwarding

Fig 7.3 Enabling X11 forwarding for connection

iv. Setting up visual interface to raspberry pi

Description: In this, we show setup wizard for how to configure the visual interface to the raspberry pi using HDMI cable. Xming is the application software that generates the visual interface from user system to raspberry pi.
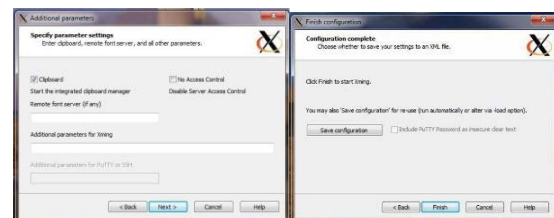

Fig 7.4 Display settings setup wizard steps
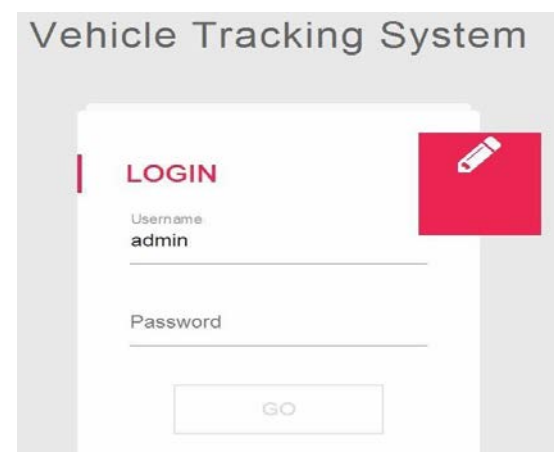
v. User Authorization:

Fig 7.5 Login screen for user

Description: The following figure shows the interface designed for the user to enter authenticated credentials and authorize login.
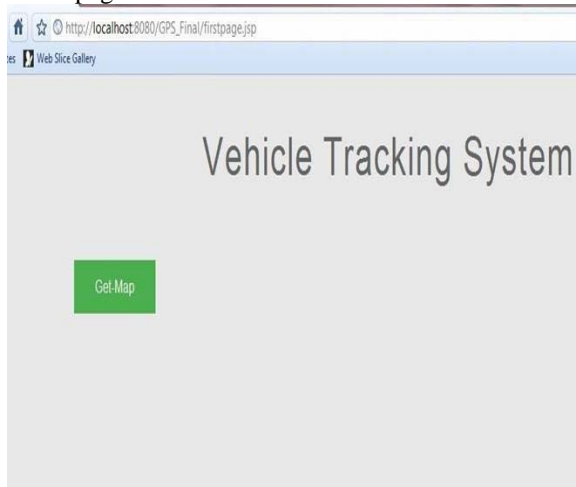
Home page:

Fig 7.6 Homepage

module and identity of a vehicle to a monitoring station and to a mobile phone according to a definite event stored in a program or a query from a monitoring station. 760Accelerometer senses the collision of the vehicle and sends this information in real time to a hospital/police station. The monitoring station display these information on GUI also stored these information in database for further process according to a program. The system is useful in much application such as surveillance, security, tracking, which may be installed in cargo trucks,

Description: The following figure shows the homepage view designed for users, who have authorized login to request for tracking vehicle.
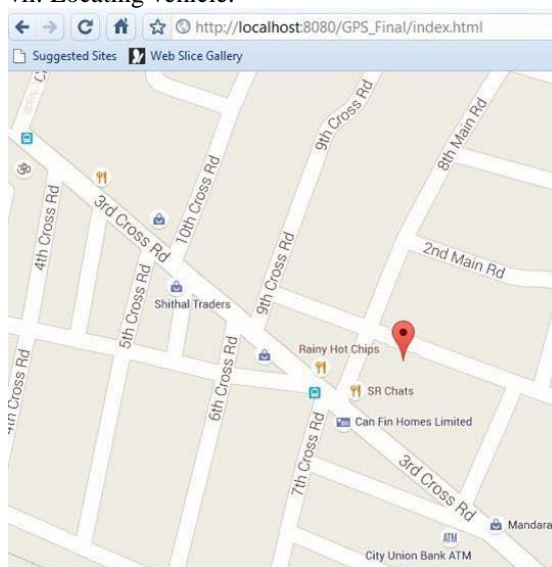
vii. Locating vehicle:

Fig 7.7 Locating vehicle

Description: The following figure shows the vehicle being tracked using the gps coordinates received from raspberry pi through cloud using internet connectivity.

VIII. CONCLUSION

The Vehicular System provides information of a vehicle like velocity, position,through a GPS cars, motorcycle, and boat. The system can be used in many applications.

IX. FUTURE ENHANCEMENT

The reliable sensor system and safety warning systems is still a long way to go. The major advantage of accident indication system based on GPS and Raspberry Pi is to avoid the human from danger. That is when Accident occurred.

In future we can avoid the LAN connection which is used for sharing IP address from Raspberry Pi to system by using improved version of Raspberry Pi.

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