Smart Shoe for Route Navigation and Location Notification
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Abstract:
Travelling short distance with personal vehicle is now widely in trend. For traffic avoidance and ease of driving along with space saving/compatibility, two wheeler are more preferred than four wheeler. When we have to drive on unknown road or we have to find out our destination for this purpose we are using GPS for route tracking but it is not convenient to use GPS during the driving. So to overcome or to solve this issue we are coming with new technology which will make our journey happy to tracking the route. Our project would revolve around coming up with a smart shoe prototype that could pair with smartphone using Hotspot and help to provide navigational information through vibration unit placed all around shoe. In essence, these shoes could give indications about when to take a turn, where to take a turn and what type of turn to take (left or right) to person wearing these smart shoes. All this information would be relayed through directions, that one could go in. there would be a microcontroller connected to a Mobile Hotspot that would send signals to vibration units based on information received. Using Google’s navigation database, we cannot only provide information for outdoor but also indoor navigation.

I. INTRODUCTION:
In the today’s society using a smart phone is normal. For various purposes smart phones and applications are available in the market. Following shows a graphical representation for increasing number of smart phone users in India. The number of smart phone users in india are increasing which is directly proportional to the increasing number of road accidents of two wheelers, due to using cellphones while driving

Along with the positive points there are some negative shades of using a smart phone. Most of us use our phones while driving which is not a good practice. Using your cell phones while driving causes distraction, resulting in hazardous effects like accidents and death. According to traffic police record near about 70% of accidents victims are two wheeler drivers. India recorded 130000 deaths due to road accidents. According to the global status report on road safety 2013, total numbers of deaths (worldwide) due to road traffic are unacceptably high which 1.24 million per year is. Following shown a graph indicating number of two wheeler accidents occurred from 2010 to 2015.

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Figure.2.Total no. of accidents
Near about 70% of accidents occurred with two wheeler drivers. Texting, using cell phone while driving causes distraction in both the cases four wheeler as well as two wheeler. Drivers using cell phones are four times more likely to be involved in accident cases. Using vehicle and modern technology such as Bluetooth for receiving calls and handling data, using navigation systems while driving may also be the cause of distraction. Along with this there are number of patients who are suffering from diseases like Alzheimer and short term memory problem. There are higher chances of misleading these people. In this paper we are going to discuss a technology, which leads you to a distraction free way of navigation, along with a helping hand for patients suffering from memory problems and their relatives and caregivers. According to the survey, there are more than 10 million cases per year of Alzheimer disease in India. Alzheimer is a mental disorder which destroys memory and may damage more if not treated in time. This disease is a chronic disease i.e. can last for years or be lifelong, hence required a helping hand. In this paper we are using an android application which provides information about the current position of patient to its relatives and caregivers. A button is provided in the application start page which automatically sends an emergency message to relatives after pressing. As it affects people younger than age group of
65, it is not much difficult to recognize and deal with it. Two wheelers are increasing and simultaneously the accident cases. Four wheelers are also a trend but two wheelers are famous in the age group between 18 to 30. Single drivers like riders and bikers use two wheeler for both short term as well as long term distance. In such case it is very complex task to see a cell phone on a timely basis. Hence need navigation without using much cell phone. Smart shoe is a shoe which provides you the directions accordingly. Vibrations are provided with the help of which user come to know where to take a turn. GPS i.e. global positioning system plays a key role in this. First user has to set the destination on his phone and click the start driving button, automatically it will take user’s current location as source i.e. start point for drive and starts providing values. The latitude and longitude of user is calculated to know the current position after he/she starts moving. The values of latitude and longitude fetching from GPS and provided to the smart phone. A smart phone needs to connect with shoes for connection. A hotspot connection of smart phone is required to connect both shoes with one device i.e. smart phone. A microcontroller is fixed in shoe which is responsible for further processing. After getting values from cell phone, microcontroller processes the data and accordingly user gets vibrations as a result. Right hoe will vibrate when right turn need to be taken and left shoe will vibrate when left turn need to be take. As the current location of the user is updated on timely basis, whenever an emergency button is pressed, an emergency text message gets send to the relatives and the patient is rescued.

II. LITERATURE SURVEY

Ubiquitous Motion Sensing Service Using Wearable Shoe Module and Mobile Device:[1] The name indicated that the system is designed and developed for Ubiquitous motion sensing. Devices developed up to now are limited for hand motions; this paper, developed a system for human computer interface which uses foot motions to connect with Smart technology. Accelerometer, gyroscope, and pressure sensors are used collectively in this. Bluetooth wireless protocol is used for connection with other devices. Angular acceleration is calculated from bottom of the feet. Feet motion detection performed. Alzheimer patients have memory issues specifically related to time and place. In this paper [2] a Global Positioning System is used to locate the patient. R-T trackers allows to have access of shoes 24 hours, a polycarbonate material is used for developing and GPS technology is placed inside it(specifically in the midsole). Energy efficiency, robustness, and reliability are the key features. GSM module is provided by sim card is used for sending messages to the respective person. Its fast to install and has ultra low power utilization, gives easy access to track and locate the patient by setting at one place. Lechal footwear technology[3] is designed for eyes-free pedestrian navigation in environment. Helps the user to keep him/her on right track by detailed and situated turn-by-turn instructions. The abnormality detection system is used in this paper for mobile balancing purpose. Interface developed in this paper uses tactile feedback to convey situated turn-by-turn information, which are provided by shoes with the help of actuators. A mobile device is essential once the user is on his way to the destination. There are limitations in this system which is independent of the interior part of shoe. There may occur circumstances like battery failure and connection loss in case of Bluetooth connection is used in this system, and along with this user might miss a turn due to bad environmental conditions. Used widely for visually impaired person. Independent of the situation in which the user supposed to hold the smart phone to get directed properly. “Emergency Tracking Using Wearable Device” is a paper[4] which designed system is not just used for navigation purpose but also used for sending location of the user to the specified person. As name suggests the system is about a smart watch which is used to provide individual a better security in the society and manages it. Early models are limited for performing tasks like calculation and game playing a smart watch plays a major role beyond this. The watch is able to send the latitude and longitude values which indicates the current position of the wearer to the predefined caregivers. In case of connection lost (between GPS and smart watch), the watch is able to establish a connection between a smart phone and a smart watch with the help of Bluetooth. With the help of Bluetooth connection user is able to use the GPS of smart phone and send the location through that. It collects information from internal and external sensors and control data from other computers. Technology automatically sets a time interval for GPS and sends messages through WhatsApp and text messages.

III. SYSTEM DESIGN:

Today many solutions are available for route tracking now a days. Many of these are wearable devices or system and also used for different purpose like for pilgrims tracking in which from lakhs of people we are able to find out or track person, Help to find track to Alzheimer’s patient family and for driving in unknown place. Various techniques were used by this systems. Data necessary for the operation of the navigation algorithm are: GPS status, longitudinal, latitude, speed and hdop. For communication with the GPS receiver class GPS Provider is used. It implements search and communication with any GPS receiver with wireless connectivity interface. When there are new data for Navigator module, the message is generated in the 1.5 to 10 seconds. One more paper in which they were using shoes for Alzheimer Patient i.e. Advanced shoes with embedded position tracking and path guidance to keep track of Alzheimer’s patients. But in this system drawback was it only find out position of person not route to track them.

![Figure 3. Architecture of System](http://ijesc.org/)
To overcome all the issues in previous system we are coming with new technology and new idea and is nothing but the by using GPS and Hotspot interface we are creating a smart shoes for route tracking. In this system we are developing a system which involves programming a microcontroller to connect with a Mobile Hotspot to receive messages and control the vibration motors accordingly. Based on the instructions received, the microcontroller would create vibration patterns to guide the user to his/her destination. A significant part of this project would also be focused on developing the circuitry required to provide different components with the right voltage, power for the required amount of time. This system is also helpful to family of Alzheimer patient to track them to the patient.

IV. IMPLEMENTATION:

In this invention there are two parts software and hardware. In software part there is android application is developed. In this app four main Activities are included as Registration of user, Login activity, Setting IP address of Micro-controller and Setting Destination where user wants to go. For all these activities we are using android studio for creating user friendly GUI and application development, NetBeans IDE 8.0.1 for connection of application and MySql query Browser and it work as a server and MySql query Browser is used for managing database. In this, using Android Studio because it is official integrated development environment (IDE) for Android platform development. Android Studio is Android's official IDE. It is purpose built for Android to accelerate your development and help you build the highest-quality apps for every Android device. It offers tools custom-tailored for Android developers, including rich code editing, debugging, testing, and profiling tools. NetBeans IDE 8.0.1 is used in this invention because The modular nature of a NetBeans Platform application gives you the power to meet complex requirements by combining several small, simple, and easily tested modules encapsulating coarsely-grained application features. Powerful versioning support helps give you confidence that your modules will work together, while strict control over the public APIs your modules expose will help you create a more flexible application that's easier to maintain. MySql Query Browser is used in this because it is a cross-platform GUI client program that's intuitive and easy to use. It provides a graphical interface to the MySQL server for querying and analyzing data. It's similar in style of use to MySQL Administrator but is oriented toward accessing database contents rather than server administration. MySQL Query Browser supports multiple server connections and opens a separate window for each connection that you establish. For connection between mobile smart phone and microcontroller use of wifi hotspot is done. Microcontroller is a hardware part and using IP address of which connection is established. As soon as a mobile set on hotspot enable mode it acts as a wireless router providing DHCP service. In android code a default password is set along with the name for wifi i.e. hotspot which we are going to use for establishing connection between smart phone and microcontroller which is going to fit in a shoe. In another part of android a code is written for fetching google map’s data i.e. latitude and longitude values, is going to connect with microcontroller units. After getting the values of latitude and longitude microcontroller is going to manage vibrations accordingly i.e. microcontroller will send instructions to the vibrating motor whenever necessary. After this left shoe vibrates when left turn and same case with the right shoe. In the microcontroller Atmega 328 there are total 28 pins working for different purposes, out of which pin no. 08 is set for sending data purpose from microcontroller to vibration motor. Following is the circuit diagram of microcontroller.

![Atmega328 diagram](image)

**Figure 4. AtMega328 pinout diagram**

For fetching data from GPS i.e. latitude and longitude values of a particular place (here destination or any other current place of user) API key is used. With the help of API key we are able to see map in smart phone application. In this invention is hardware part. This hardware part is used for directing user while driving. In this hardware part we are using Atmega 328 Microcontroller, Vibration Motor and battery for power supply. In this Micro-Controller is used for data Transmission Purpose. We are setting up connection between Micro-Controller and Mobile App using IP address of Micro-Controller and Wi-Fi Hotspot of mobile device. Main reason for using this Micro-Controller is that it is high-performance Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare mode and small in size which is easy to integrate in shoe.

![Atmega 328 Amica](image)

**Figure 5. Atmega 328 Amica**

Vibration motor is used for directing route to user through vibration. We are using Vibration motor L293D because L293D
devices are quadruple high current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are solenoids, DC and bipolar stepping motors, as well as supply applications.

![Bipolar Stepper Motor Diagram](image)

**Figure 6.** Bipolar Stepper Motor

**V. CONCLUSION:**

Proposed implementation presents the overall framework of a system for tracking and monitoring routes in unknown areas. The system consists of micro-controller, vibrator motor, Bluetooth device and Hand held application which consist of GPS services. In this we are implementing the Smart Shoe which is wearable and it can be used in any outdoor environment while being attachable to shoe. It can be used effortlessly by user to increase ease of usage.

**VI. REFERENCES**


