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Smart Shoe for Route Tracking

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Abstract - *Traveling 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 smart-phone using Bluetooth 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 (U-turn, s-turn etc.) .to person wearing these smart shoes. All this information would be relayed through six directions, that one could go in. there would be a micro-controller connected to a Bluetooth transceiver 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.*

Key Words: **Bluetooth transceiver, database, micro-controller, navigational information, smart shoe.**

1.INTRODUCTION

There are number of solution available in market for route tracking or to find out the destination on unknown roads but all the time it is not always preferred due to some circumstances which may be either environmental. Traveling 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. Motorcycles are represents power and style and also considered as durable (long term life).Along with this motorcycles also provides environment friendliness and better fuel efficiency as compared with four wheeler. Higher resale value and lower maintenance are the other reasons for enhancing (growth) number of two wheeler on road As the number of two wheeler increases, GPS navigation system is also in trend one may face difficulty using both at the same time. Accumulating these two system and use it in one makes it easier for a two wheeler drivers. . [#Note: Not necessary all are going to known destination].

Number of GPS tracking wearable devices are in market, used for different purposes. Most of the devices are limited for hand gestures/movements GPS tracking is used in regular (day to day) life as:

In this we are mainly using smart-phones, now a days everyone is capable to afford the smart-phones This devices i.e. smart-phones are cheaper, user friendly, and wearable type of device which we can carry everywhere and every time. Also, smart-phones are using operating systems such as Android, iOS and Windows Mobile, which allows the implementation of in-house applications. From this smart-phones we are taking the advantage of Bluetooth technology. Bluetooth is used as interface between the GPS and smart shoe. Through Bluetooth we are using the GPS data for finding the destination.

GPS is nothing but Global Positioning System is a worldwide radio-navigation system formed from the constellation of 24 satellites and their ground stations. The Global Positioning System is mainly funded and controlled by the U.S Department of Defense (DOD). The system was initially designed for the operation of U. S. military. But today, there are also many civil users of GPS across the whole world. The civil users are allowed to use the Standard Positioning Service without any kind of charge or restrictions.

2. PROPOSED SYSTEM

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. Various techniques were used by this systems. In this section we are go through all the available system.

Algorithm for GPS Navigation, Adapted for Visually Impaired People [6] .In this system they were not using any type of device like shoe. It is proposed to use an external GPS receiver with Bluetooth interface. Such a decision has the following advantages: still small number of mobile terminals of the medium rice segment have integrated GPS receiver; the user has the option to choose a GPS receiver, taking into account parameters such as price, sensitivity and accuracy.

Data necessary for the operation of the navigation algorithm are: GPS status, longitudinal, latitude, speed and hdop. The sequence of their obtaining is shown in Fig 1.

For communication with the GPS receiver class GPS Provider is used. It implements search and communication with any GPS receiver with Bluetooth interface. Search and connect to GPS receiver are realized without user interaction[6].

Parsing GPRMC, CPGGA and GPGSA NMEA-0183 sentences, following GPS data are obtained : status, longitude, latitude, latitude, speed, direction hdop and vdop, access to the GPS information GPS Listener.

Class GPS Dispatcher, which implements interface GPS Listener, filters GPS position and speed modules for new data availability. Communication between classes is realized through the mailbox. GPS Dispatcher class generates message “gpsdatafornavi”. When there are new data for Navigator module. This message is generated in the 1.5 to 10 seconds, depending on the 1.5 to 10 seconds, depending on the trend of the filtered speed. Each program module, that should receive messages, must define method newMessage.

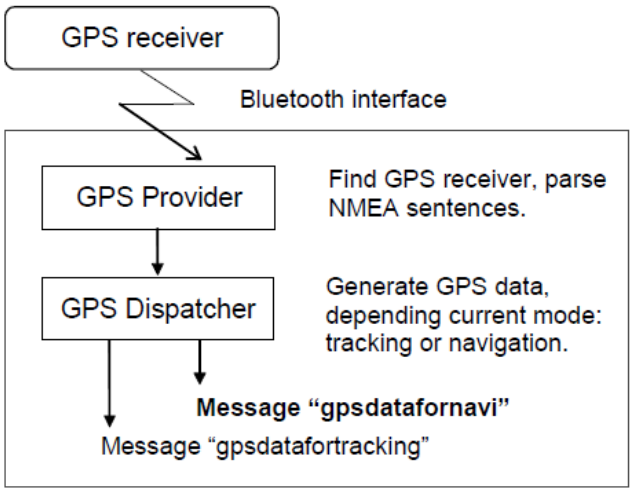

Fig. 1. Obtaining the necessary GPS data

One more paper in which they were using shoes for Alzheimer Patient i.e. [2] Advanced shoes with embedded position tracking and path guidance to keep track of Alzheimer’s patients The system proposed the GPS based wireless Shoes with path guidance. For this first store the co-ordinates coming from the GPS and the name of the place in to the SD card via the matrix Keyboard. Also store the voice from the user which records the name and other information about the place which can guide the patient or the person wearing the shoes. After this as soon as the user wears the shoes, the µc continuously compares the latitude and the longitude co-ordinates coming from the GPS every second with the co-ordinates stored in the SD card memory. If at any place the coordinates match then for that particular place the proposed system informs to user loaded information. The system shoes the name and other details of that place on the LCD and also can hear the info about the place from the earpiece. Also mobile sends these coordinates to the base unit via the GSM modem .The PC receives these coordinates via GSM and redirects these latitude and longitude coordinates to the visual basic software [2]. The VB s/w then shows these co-ordinates on the GOOGLE map so that the person can exactly locate the location of the user. The wireless helmet is a very well-organized tool for path guidance and also for tracking the user wearing the helmet via GOOGLE maps

3. RELATED WORK

Basically idea of developing smart shoe for route tracking comes from already proposed system in which they were using different technology. They come up with many advance features but also with some drawbacks. There are many smart shoes in market now a days. Most of them are used for Exercise and Gaming purpose. In this system pressure sensors and accelerometer are used. In combination of accelerometer, gyroscope pressure sensors are used[1]. But this system is totally based upon the motions or movements of legs or arm. For Alzheimer's patients, Global Positioning System (GPS) locator watches for patients are essentially RT-trackers that allow the family members or caregivers to have a complete access to whereabouts of person 24hrs[5]. In this we can track the person by using wireless device. In hajj yatra at **Saudi Arabia,** wireless sensors are used to find out location of pilgrims which are connected to Bluetooth[4].

Fitness monitoring system includes step counting, calculating number of calories burned, one may set a goal for a day. Obstacle detection system for blind[2] while helps them to walk without cane stick or any other help. It enhances the moral confidence of person (disabled). Motion sensing application for gaming[3] that actually fetch the position of gamer, gives him/her feeling as if playing in real. Step counting, motion sensing in gaming, help to make player comfortable to play. Path tracking for Alzheimer Patient[5] is important for caregivers. The patient suffering from disease (this) sometimes unable to tell his/her location or address. Such systems are developed to keep track on such patients, such GPS tracking shoes are also made for children, which makes it easy to keep track on child for parents.

4. SYSTEM DESIGN

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 Bluetooth interface we are creating a smart shoes for route tracking. Smart shoes name itself indicate that is wearable device that means we can carry this every time and everywhere. Our project goal is to develop a prototype that uses vibration motors to relay navigation instructions obtained via Bluetooth from a Smart-phone. We seek to develop a mobile app that leverages navigational information from Google's indoor and outdoor mapping database and sends this information via Bluetooth to a micro-controller. Our project would also involve programming a micro-controller to connect with a Bluetooth Chip via the serial cable to receive messages and control the vibration motors accordingly. Based on the instructions received, the micro-controller would create different 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.

Basic idea to developed such type of smart shoe is there are lot's of wearable devices in market, mostly comes under accessories section (type). One may forget to take it along with in hurry. Hence it is easier for user to use if without fail. [#Note: One cannot forget to were shoes while traveling in hurry]. Navigating the user without handling a smart-phone or reducing the level of complexity for using GPS system with two wheeler is the aim. According to the survey done by society of Indian automobile manufacturer (SIAM), The production of two wheeler in on peak.

Category	2012-13	2013-14	2014-15	2015-16
Two wheeler	15744156	16883049	18489311	18829786
Other	4903455	4617116	4868736	5130623
Grand Total	20647611	21500165	23358047	23960409

The table shows the growth in production of two wheeler since 202-2016, which indicates the necessity of developing a GPS system which is hand free for using.

To developing such type of smart shoe we want to follow some basic procedure Fig 2. Shows the system architecture. Here we are using the various key component that is Micro-controller, vibrator motor, Bluetooth Device and smart phone.

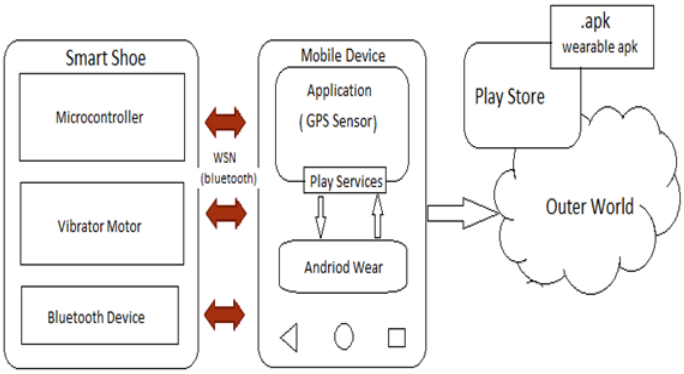

Fig 2. System Architecture

Micro-controller to provide for a distributed arrangement of components for improving ergonomics in the final product. The Micro-controller receives control signals from the Android Application through the Bluetooth Unit and sends control PWM signals to the different vibration motors. It also measures voltage across the three Force Sensitive Resistors (FSR) and calculates current and aggregated feet pressure distribution on the arches and heel. All this information is relayed back to the Android application through Bluetooth. The Arduino Pro Mini requires an operating voltage of 2.7 – 5.5V to function correctly. Analog Input from the Pressure Sensing Units should be measured by the micro-controller with 0.01Vaccuracy. According to Data-sheet, the Arduino Pro Mini is able to provide this accuracy

The Vibration Motors Unit consists of 6 vibration motors placed around the shoe that provides haptic feedback to guide the user in different directions based on PWM input signals from the micro-controller. Coin Vibration Motor Our Design contains six Coin Vibration Motors placed at the top, bottom, left, right, front and back of the shoe in order to provide corresponding directional output vibration impulses. Since, these motors have to be placed inside the shoe it is very important that they are lightweight, compact and consume minimal energy while still being able to provide sufficient vibration output. We used 310-313 Pico Drive Vibration Motors for this purpose. According to Data-sheet [2], these Vibration Motors provide for the aforementioned features.

The Bluetooth Unit was changed from TI-CC2541 BLE chip to HC-06 Bluetooth Module to ensure compatibility with all Bluetooth supported Smart-phones. With support for Bluetooth 2.0, this module helps in sending and receiving messages from android application to micro-controller and vice-versa. The Bluetooth Unit requires 3.0 – 6V for optimal performance and it syncs with a Bluetooth device within a distance of 5 ft. According to Data-sheet, this Bluetooth module encompasses all the aforementioned features.

Google Mapping Database, Google has an extensive mapping database for both outdoor and indoor purposes. This information will be leveraged by the android application to calculate control signals for the vibration motors. Navigation Notifications from the Google Mapping Database will be sent over to the Android Application depending on user location

5. EASE OF USE

This study offers ubiquitous functional system, using this smart shoes to detect the route and combine hand-held application. It can be used in outdoor environments. It can be used effortlessly by the user to increase the ease of usage. The smart in actually a detachable shoe accessory fitted with a pressure sensor pad placed inside the shoe which allow system the ability to be fitted on to any shoe with similar size, Thus increasing portability and longevity of the system.

6. CONCLUSIONS

Proposed implementation presents the over all 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.

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REFERENCES

[1] Miss. Smita S. Auti*, Prof. Nagnath B. Hulle, "Advanced shoes with embedded position tracking and path guidance to keep track of Alzheimer's patients " 2015.

[2] Ying-Xun Lai, "Ubiquitous Motion Sensing Service Using Wearable Shoe Module and Mobile Device",2015

[3] Andrea Gatto, Emanuele Frontoni, "Energy Harvesting System for Smart Shoe "2014.

[4] Jingjing Zhao, Zheng You , "A Shoe-Embedded Piezoelectric Energy Harvester for Wearable Sensors" 11 July 2014

[5] M. Mohandes, "Wireless Sensor Networks for Pilgrims Tracking," IEEE embedded systems letters, vol. 4, no. 4,– December 2012

[6] Darren, "Comfort shoes with embedded GPS to keep track of Alzheimer's patients" (October 26, 2011)

[7] Rosen S. lvanov "Algorithm for GPS Navigation, Adapted for Visually Impaired People".

[8] Li Yang, ""Smart Shoe": an autonomous inkjet-printed RFID system scavenging walking energy" 2011.