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## Wearable GPS Shoe for Pedestrian Inertial Navigation

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**Abstract**— Wearable GPS Shoe is an unimaginable cogitation for the human society. It monitors the real time location of the shoe wearer to ensure safety. GPS Shoe is inevitable for the patient of Dementia and Alzheimer also for spying on people. This paper proposes a new method to trace people's location with their shoe. GPS trace down the NMEA sentences which further extracted in latitude and longitude for navigating the shoe wearer.

**Keywords**— Global Positioning System, Arduino uno, Xbee, Xbee Adapter, LabVIEW.

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### I. INTRODUCTION

Wearable GPS Shoe is blended with GPS and Arduino microcontroller for pedestrian navigation. The proposed idea of Shoe embed with GPS is capable of navigating the location of the subject up to approx. hundred meter of range. GPS shoe traces latitude and longitude of the shoe wearer and it's present location was mapped on LabVIEW.

GPS Shoe is useful especially for patient (Alzheimer, Dementia patient), old adults, kids, and physically challenged persons. This device can be also use to surveillance someone for better health and security. Shoes are like a part of our daily accessories without this we won't likely to be able to move from source to destination. But it is not so easy for the people who is suffering from Alzheimer and dementia. GPS Shoe is inevitable for this kind of people and for their fanatic family to trace down their respective location. It is a smart way for tracking people without any extra device.

Wearable GPS Shoes is cogitation for human society. It is very essential for the people suffering from Alzheimer and Dementia in this disease person losses his/her memory So, GPS Shoe is a caregiver accessory for them, also Kids can be recorded by their walk around.

### II. WEARABLE TECHNOLOGY

Wearable technology which we can wear on our body. This is the era of wearable technology in the future this technology will be part of our life. Human society will be highly equipped with the embedded products so extensively, without which our life will be difficult. Wearable technology is associated with fashion, cloths, Shoes, Smart Watches, and accessories that incorporate electronics equipment into it. [1]. Wearable technology is an open source research project that emerges with the web world to provide "Real time Communication" (RTC). [9] It can provide communication with the web like Google glass, Smart watches.

### III. GLOBAL POSITIONING SYSTEM

Global Positioning system is a constellation system of 24 satellites to trace the location of an object. GPS directly communicate with the satellite and generate the parameter (latitude, longitude, Altitude) of the respective location. GPS satellite incessantly transmit current location and time

at the receiver side, Receiver invigilate multiple satellites and compare equation to figure out the real time location.

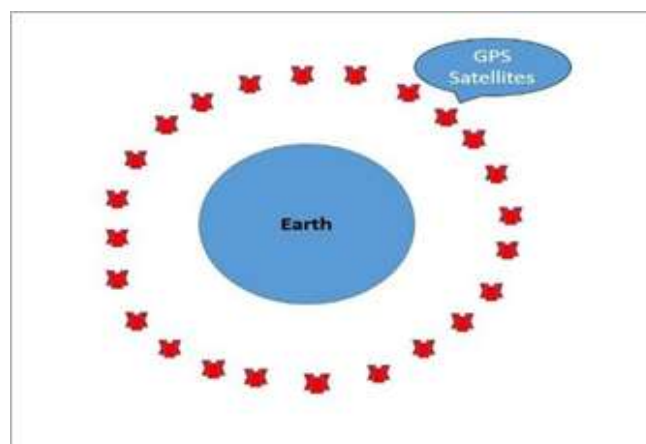


Fig. 1. Illustration of GPS Satellite Communication

GPS work on the principle of trilateration, Trilateration is the process of adjudging the locus or point by measuring the distance between the geometry of circle, spheres or triangle. So, GPS uses this technique to find the exact location with at least four satellites at a time. The satellites measures the distance from the respective location and simplify trilateration geometry to adjudge the exact location of the object. [2]

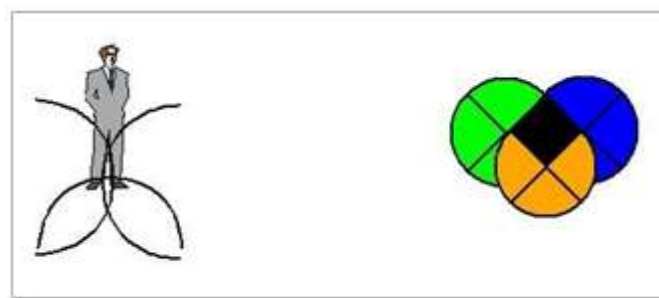


Fig. 2. Trilateration concept

### IV. WORKING PRINCIPLE OF GPS SHOE

The model works with GPS module connected to Arduino uno. The Latitude and Longitude are fetched by GPS are being provided to Arduino uno and the latitude and longitude is transmitted throw Xbee. [7] On the other hand the Xbee

receiver collect all latitude and longitude gives to the LabVIEW. The LabVIEW fetches latitude and longitude in the front panel and redirect the exact location of the object.

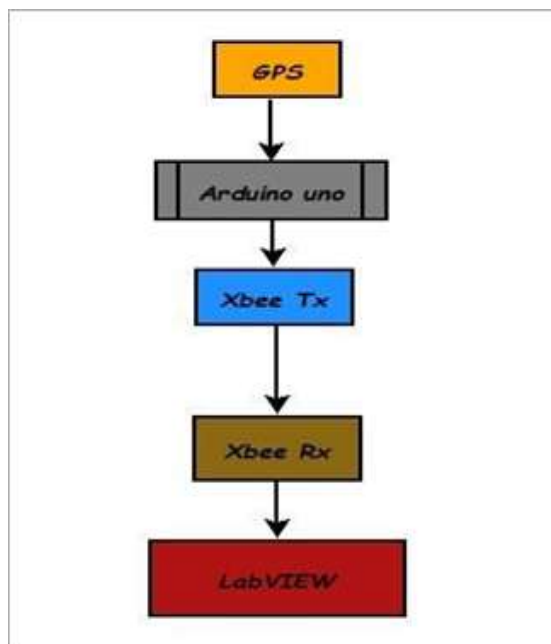


Fig. 3. Flow Chart Diagram of GPS Shoe

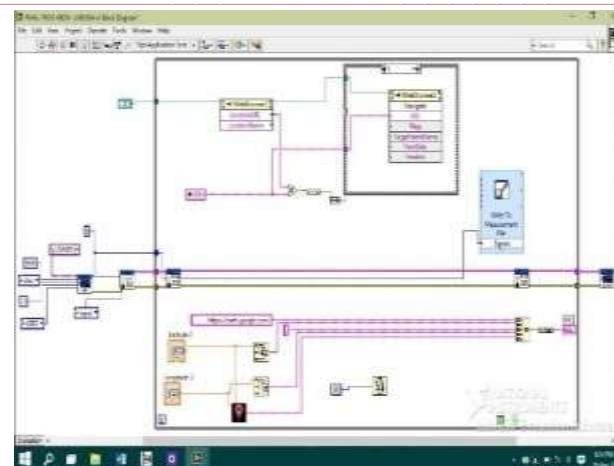


Fig. 5. (a). Block Diagram of LabVIEW

Number to fraction string is connected to latitude and longitude to the concatenate string which acquire all the nodes and URL respectively. The output of concatenate string is provided to URL local variable. A delay wait until next millisecond multiple is provide in order to identify the each iteration. The front panel is for user to determine the GPS Shoe location here in the demonstration VIT Chennai location is traced.



Fig. 4. Real time location on LabVIEW

## V. LABVIEW INTERFACING WITH ARDUIN

LabVIEW is interface with Arduino with the help of VI Package manager. VI Package manager privilege to install LabVIEW libraries for Arduino compatibility. Here to interface Arduino to Labview we need "LabVIEW Interface for Arduino" is available through which we can interface Labview to Arduino. The respective library is placed to proper location of Labview files manger.

A case structure loop is taken within the while loop. While loop is connected to the web browser doc which is connected to property node. Inside the case structure under the true condition invoke node is introduced to navigate the location through web browser. [4] Also an initial Arduino is introduced to the while loop, the data i.e. latitude and longitude coming through Arduino and Xbee fed to while loop. The Latitude and longitude values is fed into write to measurement unit to save the respective nodes of the location.

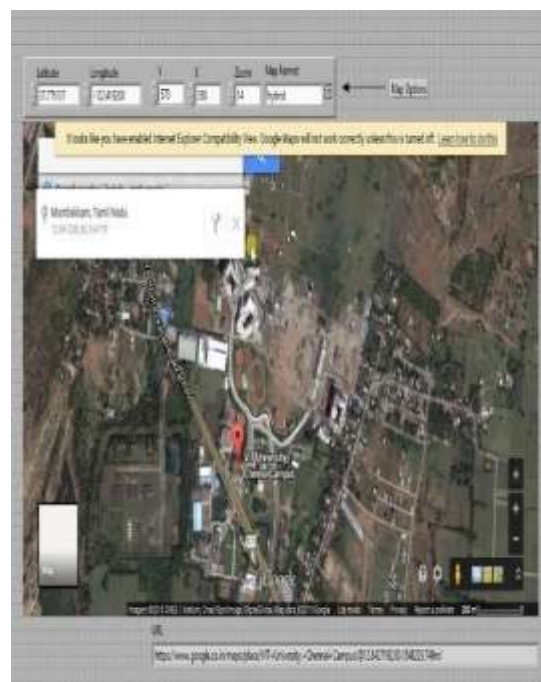


Fig. 5. (b). Front Panel of Labview demonstrating VIT Chennai Location

## VI. RESULT

GPS and Arduino uno is mounted on an unadorned shoe to navigate the location of the shoe wearer. The navigation of the GPS Shoe is demonstrated on LabVIEW front panel. GPS navigate the location through the principle of trilateration from geometry. Front panel of the Labview demonstrate VIT Chennai location. The value of latitude and longitude is fed into excel sheet and the URL is frequently alters the location of the Google map with

respect to acquired value of latitude and longitude concurrently.



Fig. 6. Wearable GPS Shoe  
Demonstration

## VII. CONCLUSION

This paper demonstrates the GPS Shoe for pedestrian inertial navigation. The demonstration is done on Arduino uno mounted on Shoe to trace latitude and longitude of the wearer. The paper shows the real time navigation of GPS Shoe shown on LabVIEW. Arduino uno is used to acquire data from GPS and transmission of data i.e. latitude and longitude is done wirelessly by Xbee.

## VIII. FUTURE WORK

The size of the component used in the GPS Shoe can be minimize in future. GPS Shoe bulkiness can reduce. It can be trace more accurately the location of the Shoe wearer. The range of the GPS shoe can increase.

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