Abstract: Every house has had a history of searching for keys, pen-drives, wallets and hand-purses and it is such a tedious job, especially, when they are of utmost need. To reduce the hectic searching effort and time spent, a system is proposed, with the lost items connected to wireless sensors (Bluetooth). A mobile application (the tracking device) is created as an interface between the wireless sensors and the user. The transmitter end sends a signal to the receiver sensor, which after being traced will start ringing, to notify the user as to where the lost item is. A GPS-GSM system is integrated with the proposed system to navigate and locate the lost item if it is out of a specified range. Being at a plethora of availability the user will be able to combine task and view the required output as mobile alerts. The system acts as a multipurpose device, which besides discovering lost items also prevents theft and tracks the stolen objects.

Keywords: User-Interface, mobile application, wireless sensor, Bluetooth, GPS, GSM.

I. INTRODUCTION

Creating a ubiquitous system that would help decrease the work load of a human being is the main aspect of any new invention. After all the inventions and discoveries, one thing that has been troubling man despite of the luxury is, locating lost objects [6]. 99.9% of people have complained of loosing items that are most frequently used. Students’ Identity cards, Elders’ eyeglasses, fathers’ car keychain and mothers’ wallets, these are the most misplaced households. The proposed system would prove to be efficient to find the items that are misplaced. The lost objects could be easily found with a simple application that comes handy with our mobile phone.

II. SURVEY

The focus of the literature review is to provide a demographic percentage of the effects of losing items and the outcomes of locating the items (easily). People could of course search their whole house putting it upside down to find the lost pen-drive, if only all human beings had the patience and time. Besides, not every family can afford an iOS, but every house has a history of misplacing their physical items.

To find out the factors influencing recovery of lost items, frequency of losing and the probability of finding it, a rough survey was conducted among few students. It was no surprise that 9 out of 10 people misplaced the items that they frequently used and the time of recovery was almost thrice of what it should generally take. When gadgets and devices keep increasing in the house, the probability of locating them exponentially decrease.

2.1 Who loses objects?

The citation “Finding Lost Objects: Informing the Design of ubiquitous Computing Services for the Home- published in 2010”, gave a result on which age-group had a higher probability of misplacing and what was the reason behind it.

![Table to specify who loses items.]

Here the age group and the reason for loss are described with the help of the percentage of occurrence. Young people of the age 20-36 have a greater percentage of inattentiveness, which might be a major reason for losing their belongings. The old age people on the other hand, have greater memory-related problems, because of which they could forget to remember where they had used the item last.

2.2 What objects are lost?

The result of the survey is that frequently used items are lost often. Out of the surveyed students nearly 90% of them confessed that they had to search for their ID Cards almost every morning, when they are already running late for their buses. About 50% of them said they had to have spare pen-drives with them fearing that they would lose them when they are the most required. 40-50% students admitted that they had to make at least about three duplicate keys because they misplaced their key chains and couldn’t find them anywhere. What if man loses his cell phone or wallet? That would indeed be a serious issue.

2.3 Strategies Used to Find Objects

Responses from the participants showed that there were common strategies that people engage in regardless of age or object type. We identified these strategies as...
1. Retrace - areas are searched with respect to a sequential basis of a person’s prior physical locations.
2. Memory - location is searched based on a person’s memory of prior interactions with the object.
3. Exhaustive search - all possible area is searched.
4. Locus search – location where the object is normally to be found is searched.
5. Delegation search - someone other than the person needing the object searches for it.

The most frequently employed strategies to recover a lost object were locus search (33%), exhaustive search (24%) and retrace (19%). The remaining strategies, memory and delegation search were both reported 11% of the time. Although location search and exhaustive search are primary strategies across age groups, the older adults indicated that they rely far more on retrace (26%) as compared to young and middle-age adults (both 10% occurrence). Note that the delegation search strategy includes the use of technology (portable phone and remote control locators - 2%). This result showed that people seek assistance for searching but may have limited technological choices to use. Results indicated that the participants were somewhat successful when searching for lost objects [6] [7].

III. EXISTING SYSTEM

The existing system consists of a mobile application to help the user select the object he wants to find, via the internet. The user selects the option that he needs- i.e. Car-Key if he misplaces it. [9]The transmitter sends a signal to the receiving sensor, which is attached to the car-keychain. When the sensor attached to the keychain matches the code-signal being sent, it starts ringing to notify the user where the item is. Once the user locates the key the audio is turned off. The systems with similar functions are, StickNFind, Tracker and Gadget Hound [11] that implements the same idea of locating misplaced items. But the problem is that the existing devices are used only in Smart phones and use complicated and tech-savvy applications, which unfortunately are not understood by everybody. Another problem occurs with the cost. The sensors used are generally very expensive and not feasible to be used on objects that are of daily use. The sensors with better battery-life are quite expensive. A transponder is attached to an object that will respond to a signal sent from the services base station. The base station provides a user interface that displays a picture or label and an adjacent button that corresponds to the object to be located. When a button is depressed, the base station sends an inaudible signal to the transponder and an audible tone is emitted in response. The user must follow the sound to find the objects’ position. Whether the object is an individual or multiple user type is not a consideration for this service. If the object is moved out of detectable range, the service is ineffective. If the base station’s effective range covers the entire house, this mitigates the likeliness that the object will be moved out of range. Form factor is also an important consideration, as the transponder must be attached in some manner to the object. As the service is limited in the number objects it can find, the user may have to decide which objects have priority for use with the service. Also usage of timescale considerations can affect service usage. Although a past memory of the object may not be necessary to find an object within range, it may affect the time needed to recover it. Here situation factors for losing the object are minimized but if the object is out of range or cannot be heard, it will not support the other search strategies. Some services use the camera’s capabilities to take close-up, high-resolution images of the monitored locations. These images are processed to identify objects that have been described in a recognition database. The service is capable of finding the activity within a camera’s area of vision. When the activity terminates, the service processes the images to detect changes in the scene to detect object presence or absence. A location database stores the information about image changes and maintains a list of objects that have been recognized. [8] The user can query both the object and the location database using a touch screen, visual interface. It was designed to answer questions of the current location of a known object. Object type can affect service performance if the object has been removed or obscured in the monitored environment.

The existing system requires an Ethernet Tag Manager Operation to finding the lost items. [6] It uses composite methodologies in the searching process. Also, the mobile application is created using Java or PHP which requires a lot of memory space. It also involves complex lines of coding. The prevailing system searches the misplaced items with the help of internet and it doesn’t apply if there is no net connection. Therefore it involves Internet throughout the operation.

IV. PROPOSED SYSTEM

The proposed system rules out all the impossibilities and the disadvantages of the existing system. First issue that has been solved is the complexity of the device. The system’s user-interface is simple and user friendly. Secondly, the cost and expense of the system is reduced. The sensors used are feasible and have a long-battery life. Generic transmitters and receivers can be applied instead of a Bluetooth embedded transmitter and receiver. The device could be embedded with its own GPS-like system and Antenna (which would behave like a satellite) and could map the location of the lost/tracked object. Mapping could be done using mathematical calculations like Trigonometry heights and distances and angle calculations. The proposed system would also support internationalization, thereby providing international acceptance. The advantage of this system is that it switches on the GPS only when the user requests.

A. ARCHITECTURE OF PROPOSED SYSTEM

The user has to select an item from the list of items in the mobile application to which the sensors are attached. Pseudo random codes are sent to all the sensors in the form of radio waves. These codes are received by the sensors in the items. The receiver that matches with the code initiates the alarm system and the item starts ringing. The other receivers will remain idle.
The above fig.(2) specifies the working model of the proposed system. The modules of the project include:

- Global Positioning System (GPS)
- The Global System for Mobile Communications (GSM)
- Sensor and Tracking
- Mobile application (User Interface)
- Integrating GPS and GSM
- Integrating Mobile Application and hardware.

In case the item is not within the range, GPS would be initiated. The item is tracked using GPS. A database called a ‘Location Manager’ that holds all the locations of the misplaced items is used. This location manager will further provide details to the user through the application. This diagram explains how the Mobile handset locates the sensors, using a pseudo-random code which when matches the right destination starts ringing, in order to make the user alert. The buzzer can be switched off once the object is found.

B. MOBILE APPLICATION (USER INTERFACE)

A mobile application, Fig.3, is used as a user-interface to facilitate the user to choose what object she/he needs to locate. The mobile application is written using Java script and could be run in android mobile phones. The application allows the user to select from the option- Menu, which contains the list of synchronized tags, GPS, which is the GPS application which maps to the location of the sensor, and History contains details about the past searches.

The user can select from the menu, of what object she wants to locate. The menu also provides an option for the user to replace the Tag name with the item name, eg., here Tag 1 was replaced by BIKE KEY, and Tag 2 is being renamed to another item, by choosing the edit option provided.[10]

Once the item is chosen, the pseudo-random code is generated and the radio-signal is broadcasted. The tag with the matching signal, from the receiver end, is synchronized and the alarm system gets activated. The history column is a database which stores the past activities of the user involved in the search process. The location originally tracked can be stored and modified in the GPS database which can be retrieved during the next search.

C. GLOBAL POSITIONING SYSTEM (GPS) AND GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)

A GPS receiver relies on radio waves and it communicates with satellites that orbit the earth. In order to determine the object’s location, a GPS receiver has to determine:

- The locations of at least three satellites above the item
- Where the items are in relation to those satellites

The receiver then uses Trilateration to determine your exact location[4]. Basically, it draws a sphere around each of three satellites it can locate. These three spheres intersect in two points -- one is in space, and one is on the ground. The point on the ground at which the three spheres intersect is your item’s location.

GSM is used to return the latitude and longitude as a text message. The mobile is synchronized with the GSM module and the process is initiated with a text to the
GSM module from the mobile. The GSM receives it and it returns the latitude and longitude calculated by the GPS in the form of message to the mobile phone.

E. BLUETOOTH AND TRACKING

The user has to select the lost item’s button from the list in the mobile application. 128 bit pseudo random in the form of radio signals from are sent as Bluetooth. The mobile and the receivers are synchronized to the same frequency. The transmitter's controller chip has a memory location that holds the existing 40 bit code. The receiver's controller chip also has a memory location that holds the current 40-bit code. If the receiver gets the 40 bit code it looks forward to, then it performs the requested function. If not, the mobile application notifies the user the object is not found and asks whether the GPS as to be switched on. Both the transmitter and the receiver use the same pseudo-random number generator. When the transmitter sends the bit code, it uses a pseudorandom number generator to select a new code, which is stored in its memory. On the receiver end, when the sensor receives a valid code, it uses the same pseudo-random number generator to pick a new one. This means, the transmitter and the receiver are synchronized. The receiver initiates the buzzer system only if it receives the code it expects. The other receivers will remain idle. In case the item is not within the range, GPS would be initiated. We can find the item using GPS. A database called a ‘Location Manager’ that holds all the locations of the misplaced items is used. The details from this location manager can be retrieved and used whenever needed [1] [2] [5][11]

F. ADVANTAGE OF PROPOSED SYSTEM

The proposed system involves the usage of an Android application which is the commonly used by everyone. Also, the usage of internet is needed only when the object to be found is out of the limit range, i.e, while using the GPS system. If the object is within the range, then Bluetooth is used to and signals are generated and the objects are tracked by the beep sound heard from the sensors fitted with the commonly misplaced items. It goes for GPS search if the object is out of range or not identifiable. Once implemented, this method would be cost effective and easy to work on.Fig8-9.

Fig.5: Flowchart showing the working process.

IV. SUMMARY

From the above steps and procedure, the working of the system can be summarized as follows: The user chooses the object/option she has misplaced from the menu displayed in the mobile application. The pseudo-random code is generated and radio signals are broadcasted. The matching signal from the receiver end is found. When the item is found the buzzer in the system gets activated and starts ringing. The user gets alert and finds the item. If the item is not located the user is asked if she needs to switch on the GPS system. When the user selects the GPS option, it maps to the required address and the item is tracked. The tracked address can be stored and modified into the location manager (database) which can be retrieved for the next search.

IV. RESULTS

The proposed system when implemented showed some positive results. The consistency of the system was checked and the outcome was plotted as a graph. The system was tested within different range limits and the results are recorded.
The blocking diagram of the hardware part of the system is given below.

The Experimental kit with GPS and GSM is shown in the screenshots from Fig 8-10.

VI. FUTURE ENHANCEMENTS

The crux of this model lies in its ability to provide an efficient and luxurious system to find lost items. To enhance this system further, the challenge is to implement the mobile application without the use of Internet so that it could be used even in basic mobile phones, and not only the smart-phone apps. Including other user-interface features like voice-input, retina-scan for security etc, could make the system a better and proficient one. The database memory, GPS usage, mapping functionality including 3D mapping could be enhanced for future work.

VII. REFERENCES

1) “Location Based Intelligent Mobile Organizer”, Ananya S, Venkatalakshmi B.
2) “GPS Phone to Take the Stage at CTIA.” week.com, March 10, Ellison, Carol 2005.
4) “New GPS to be Built into Cell Phones, Study Says.” InformationWeek, May 13, 2005.
6) “Localization and Object Tracking in an Ultrawideband Sensor Network by Cheng Chang.”
7) “Objects Calling Home: Locating Objects Using Mobile Phones” Christian Frank1, Philipp Bolliger1, Christof Roduner1, and Wolfgang Kellerer2.
10) “Real-time Bluetooth communication between an FPGA based embedded system and an Android phone” by Hawayek, S.; Electr. & Comput. Eng. Dept., Univ. of North Carolina at Charlotte, Charlotte, NC, USA; Hargrove, C.; BouSaba, N.A.