



## TRACKING MISPLACED OBJECTS THROUGH ARDUINO –UNO AND GPS-GSM

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### ABSTRACT

*In this era of digitized world there are millions of smart devices mushrooming to meet the challenges emerging out of innovations and technology developments in ubiquitous computing. All these smart devices are subjected to everyday objects that are interconnected with the Web. Web of Things describes the way how these objects are tagged to the Internet and does the process of communication with each other through web standards. The development of ubiquitous systems reduces the task of human being. These inventions created a scenario among the people to lead a luxurious life in a most comfortable zone. Ultimately everyone started keeping their valuable things according to their movements inside home or at office and always behind the misplaced or lost objects. In every house there is a history leading out for searching towards keys, wallets, pen drives and hand purses which becomes a tedious job especially during utmost need and peak hours. To reduce this effort and save time, a device model is proposed wherein the lost items could be tracked and traced out. The proposed work acts as a fundamental concept in describing how to track the objects conveniently. This is a basic device model that describes about tracking an object that interfaces with Android mobile devices to locate objects using android application through Wi-Fi connectivity with GSM and GPS controllers.*

**KEYWORDS:** Android Mobile Phone, GSM, ARDUINO Microcontroller, buzzer, battery, GPS controller.

### INTRODUCTION

One of the buzzword in the Information Technology is Internet of Things (IoT). The future is Internet of Things, which will transform the real world objects into intelligent virtual objects. The IoT aims to unify everything in our world under a common infrastructure, giving us not only control of things around us, but also keeping us informed of the state of the things. In Light of this, present study addresses IoT concepts through systematic review of scholarly research papers, corporate white papers, professional discussions with experts and online databases. Moreover this research article focuses on definitions, geneses, basic requirements, characteristics and aliases of Internet of Things. The Internet of things (IOT) is the internetworking of physical devices, connected devices, and smart devices and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data [1]. Identification of smart objects was developed using the concept of IOT. The mobile

phones are the inspirable part of human lives today. This smart tracker acts as an effective kit to track even human beings. We can make our home as well as organization smarter or more secure. The fundamental concept of IoT is the internetworking of physical devices, connected devices, and smart devices and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. The Internet of things is a vision of connectivity for anything, anywhere and at any time. Now a day's technology becomes ever more invasive, the design challenges in internet of things are increasingly apparent. A smartphone is a mobile phone with highly advanced features. A typical smartphone has a high-resolution touch screen display, WiFi connectivity, Web browsing capabilities, and the ability to accept sophisticated applications. The majority of these devices run on any of these popular mobile operating systems: Android, Symbian, iOS, BlackBerry OS and Windows Mobile. A smartphone is expected to have a

more powerful CPU, more storage space, more RAM, greater connectivity options and larger screen than a regular cell phone. Here a new technology is implied, where smart phone is used to track our day to day objects. In future, we can use router for a wide range access like for the Smart City projects. New appliances can be added anytime to the system, which provides for the reliability of the system. Creating a ubiquitous system that would help decrease the work load of a human being is the main aspect of any new invention.

#### RELATED WORK

In [1] the author introduces 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. The transmitter sends a signal to the receiving sensor, which is attached to the car-keychain. A variety of search strategies was assessed based on their ability to track the location of people and objects and replay histories of this information. The model proposed in [2] aims in developing an integrated application, namely Location Based Intelligent Mobile Organizer that will facilitate user with location aware services. Retailers could also publish their product discount information by registering in our authorized web site. All users with this loaded application will reap immense benefit through this application. This intelligent observer module is developed using Jdk 6, Eclipse and Android 4.2(Google api) installed on Windows Operating System. The work in [3] presents a location-based business promoting system. The proposed work is able to provide mobile users a convenient way for searching required local business according to the ratings given by mobile users. In addition, mobile user will get reward points for every login. The related work in [4] explores the architecture, design, and evaluation of an object search system relying on mobile phones as omnipresent object-sensing devices. Based on the ubiquitous mobile network infrastructure which is already in place, wide-area search for everyday objects becomes possible without incurring the high costs involved in incrementing a larger environment with an object-sensing taxonomized location system properties, and surveyed research and commercial location systems that define the field and offered approach comparing these systems to help researchers make better choices for the location systems they use in ubiquitous applications. Given all these literature review it is understood that not much exploration has been so far made using Internet of Things which may reveal more interesting performance improvements. Exploiting Bluetooth on Android mobile devices for tracking of objects,

which Uses Techniques like Arduino controller Android smart phone was introduced at May-2014 which preferred Techniques like PIC Controller and Bluetooth. Locate Misplaced Objects! GPS-GSM-Bluetooth Enabled Tracking IoT based Home Automation Using Android Application by P.SivaNagendra Reddy. Smart Home System for Disabled People Via Wireless Bluetooth gives money wise concept by using GPRS as the medium to control and monitor home appliances. These are some of the literacy study that makes the proposed work to be designed.

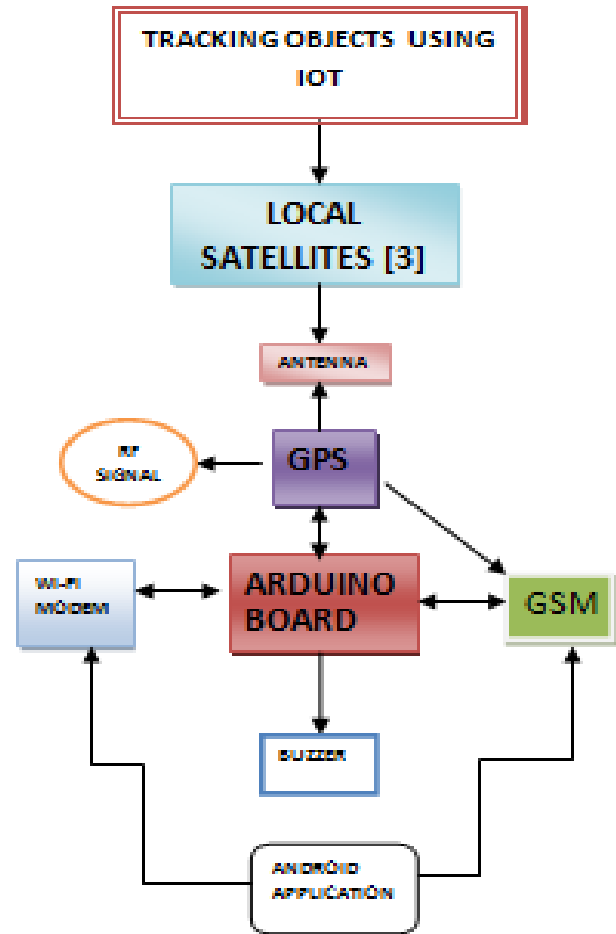
#### METHODOLOGY

People live in this fast moving new era of smart devices wherein everyone works 24/7 in almost all the field of applications. Jobs are not defined and hence it has become a need to all to “work at office and work at home”. So everyone has to keep themselves active and work continuously with a busy schedule calendar to complete their assigned tasks. Out of this scenario it has become common that people often misplace their gadgets and belongings. People could of course search their whole house putting it upside down to find the lost belongings mostly due to frustration and lack of time. Hence a tracking device which will be useful for all sorts of people who get frustrated when losing or misplacing their personal belongings especially electronic gadgets is essential. This proposed work presents a device model for tracking an object that interfaces with Android mobile devices. A GPS-GSM technology is integrated to the proposed work i.e., attached to a hardware components known as arduino (UNO) to navigate and locate the lost item if it is out of a specified range. The purpose is to develop a tracking device which is useful for all sorts of people to identify the objects such as wallets, keys, pen drive, laptops etc. This will be useful to enable person to easily locate and find lost or misplaced object or items common to household and more particularly wireless transmitter and receiver is attached to an object. This tracking kit (Arduino-UNO) has to be attached with the object and the android application that is developed plays a major role here. The input that is given through android application to the GPS Receiver is embedded to the Arduino board by selecting a particular object to be tracked. Once the input has been received the GPS will send the latitude and longitude position on which the searching object is located, to GSM. The GSM will act as an Input Medium and supports to transmit latitude and longitude position to the android application as input message.

## PROPOSED WORK

The existing methods generally relates to an object finder and, more particularly, to an object finder capable of locating an object of interest in an adjustable range [6]. Object finders on the market may not be user friendly [7]. The device could be embedded with its own GPS and Antenna 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. Here, the tracking of the objects can be done only within a particular range.

The proposed work has ruled out few of the impossibilities of the existing work. First issue that has been solved is the complexity of the device. The device model is simple and user friendly. Secondly, the cost and expense is reduced compared to existing work where bluetooth is adopted for tracking objects. In this proposed work, the main objective is to control the objects using android mobile through Wi-Fi connectivity. Android based application used in this model helps the user to select the object to be traced, via the internet. When the GSM receives the signals from GPS, it sends the message to the application which leads to the location tracking as well as ringing of buzzer to notify the user about the location of the selected object. Once the user locates the key the buzzer is turned off. This work consists of Generic transmitters like Bluetooth embedded transmitter and receiver has been applied. Mapping could be done using mathematical calculations like Trigonometry heights and distances and angle calculations. Here, the tracking of the objects can be done only within a particular range. The below flow diagram depicts the overall functioning of the related work. The work does not have any service provider within the country And in case of failure the components has to be replaced.



**FIGURE I**  
**ILLUSTRATES THE OVERALL CONTROL**  
**FUNCTION OF THE WORK**

The following section describes about the software and hardware design that is adopted in this related architecture framework in tracking an object. This project is mainly developed for the elderly people who get frustrated while losing or misplacing their objects. There are two modules namely object module in which GPS is connected which records the location (latitude and longitude) of the object. The other is user module which is the Android app where the user can find their misplaced objects using the “Track O” app. Once the user triggers the app, the initially Home page will be displayed. Then automatically the app enters into the login page, where the user should login. This screen displays the most commonly misplaced personal objects and the user has to choose anyone out of it for the object to be tracked. A list of around four objects will appear on the front screen wherein the user selects the related object to be located.

The user should choose the misplaced or lost object. Once the object has been touched, automatically the Google map page gets configured, where the user location will be indicated in green color location and the object that has been misplaced will be indicated in red color location. The path between the two locations will be shown through road route. Once the Google map is configured and location of the object is indicated in the map, automatically the buzzer starts ringing which has been placed in the kit. This is also one of the identification of the object. When the object is misplaced in a nearby location, it can be found using this buzzer sound. Thus, the user can find their object easily either by the route that is shown in the map, or through the buzzer sound.

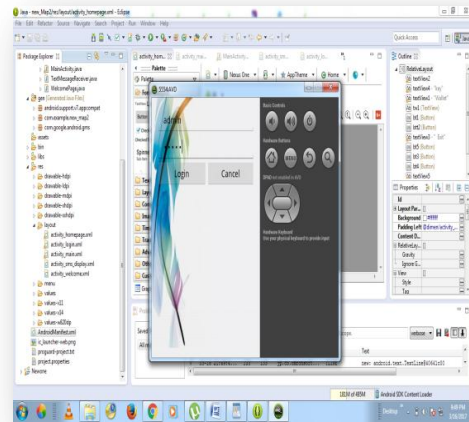


**FIGURE II  
USER MODULE**

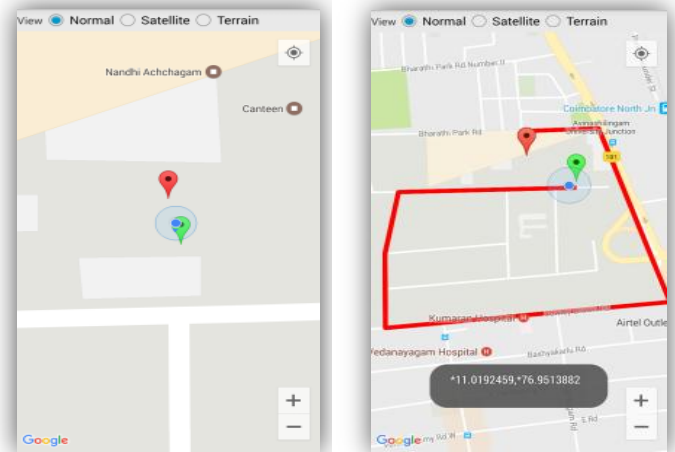
Android is an Operating System for smart phone devices on which we can run our application. We can develop android applications [8] using Android SDK, MIT App Inventor, Intel SDK and etc. According to user convenient we can use one of the tools. In this work we developed android application using android SDK. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using Java. By providing an open development framework, Android offers developers the capability to build very rich and new applications. Android mobile that is being used in the project enables to communicate with the GPS, GSM that is being connected in the other end via arduino board.

The GSM receiver that is attached in the arduino board will receive the latitude and longitude position from the GPS antenna. The received position will be transferred to the smart phone as input to the Google map that is already loaded in the android application. The location will be received by the Google map through Wi-Fi module. The android application was developed by placing java programming language. This work can be tracked

even at a longer distance. It provides greater efficiency and better service and can be serviced within the country and ensures security. The advantage of this concept is that it switches on the GPS only when the user requests. Minimum time is needed for the various processing and the app is very user friendly and interactive. Fig. III and Fig IV illustrates the User Login Page and the Google Map.

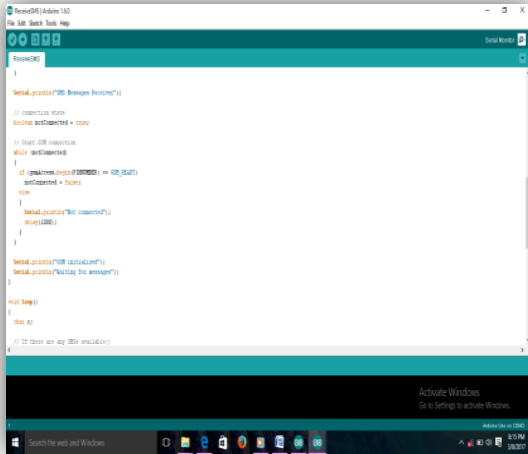


**FIGURE III  
ILLUSTRATES THE LOGIN PAGE OF THE  
APPLICATION**



**FIGURE IV  
GOOGLE MAP**

Fig III is the screen shot specifying the user login page. In Figure III the location is tracked and the latitude and longitude will be positioned where exactly the object is located. The work is mainly used to in-built the actions or activities to be performed in the particular product that we develop, into an Arduino micro controller.



**FIGURE V  
SCREENSHOT OF ARDUINO IDE**

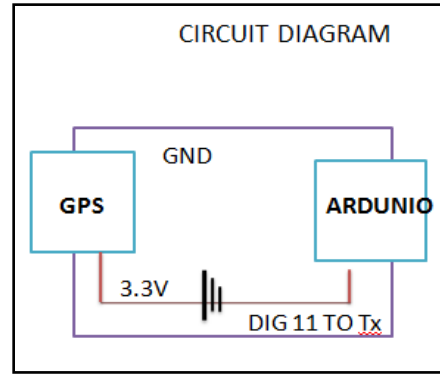
The above Fig V shows the coding screenshot of the Arduino IDE software. The program is embedded into the IC chip which is in the board, by connecting the software and the hardware (Arduino board), using the USB cable. The program that is embedded last will be saved in the chip. In Arduino IDE software[8], there are predefined sample codes will be present. Hence, to write the coding for any of the Arduino connectivity is very simple and easy by using this software.

The object module that is used is the arduino board that is embedded with certain components like GPS,GSM, Wi-Fi Module, buzzer and LED. The focus is to control the objects using android mobile through Wi-Fi connectivity. The connections are given with the help of wires and it is closed to the circuit. The connected circuits are shown below in Fig VI.

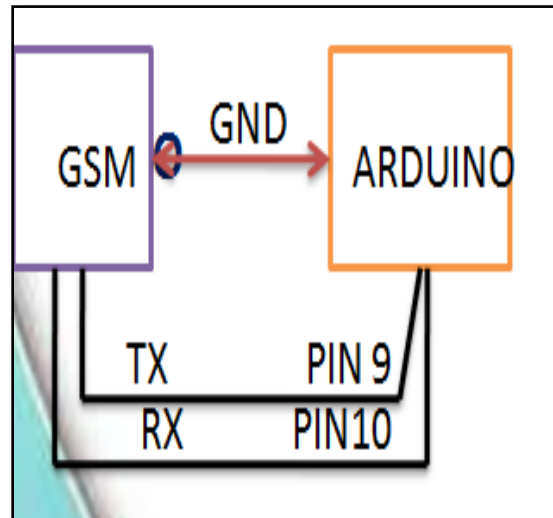


**FIGURE VI  
CONNECTED CIRCUITS**

This tracking kit can be placed in any object which is frequently misplaced by the user. GPS module that is embedded in the board will receive the RF signals and sends to the board. From the board the location is send as text messages to the application. Once the input has been received by the application, the map will be loaded so that we can trace the location. The below screens describes the process in Fig-6 Circuit diagram that connects GPS and arduino and Fig-7Circuit diagram that connects GSM and arduinoboard.GSM helps to transmit the latitude and longitude position given by the GPS and acts as an input medium. The received signals will be transmitted to the android application through input message and the object will be tracked within five minutes of time duration.



**FIGURE VII  
CIRCUIT DIAGRAM OF GPS AND ARDUINO**



**FIGURE VIII  
CIRCUIT DIAGRAM THAT CONNECTS GSM AND ARDUINO BOARD.**

User Module is the android application that is developed with the help of Eclipse software. Android application[9] is interlinked with an Object Module through Wi-Fi connectivity. The GPS (Global positioning system) Module that is embedded with the Object Module, will send the latitude and longitude[10] position of the Object to be tracked through GSM (Global system for mobile communication). GSM receiver will collect the position and send them back as an input to the User Module. Google Map that is embedded in the application will receive the message and routes the path on and the misplaced or Lost Object could be located.

The GPS Module that is embedded with the Object Module will send the latitude and longitude position of the Object to be tracked through GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION). GSM receiver then collects the position and sends them back as an input to the User Module. Google Map that is embedded in the application will receive the message and routes the path on which the misplaced or Lost Object is exactly located.

## CONCLUSION

This paper presented a device model with an Android application via Wi-Fi Module. The purpose is to develop a tracking device which is useful for all sorts of people who get frustrated while losing or misplacing objects such as wallets, keys, pen drive, laptops etc. This is a basic device model that describes about tracking an object that interfaces with Android mobile devices to locate objects using android application through Wi-Fi connectivity with GSM and GPS controllers. GSM helps to transmit the latitude and longitude position given by the GPS and acts as an input medium. The received signals will be transmitted to the android application through input message and the object will be tracked which will be indicated through a light glow and a buzzer sound. The challenge is to include other user-interface features like voice-input to be responded when the object is tracked.

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