

# IOT Based Smart GPS Device for Child and Women Safety Applications

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**Abstract:** This work is based on IOT (Internet of Things). As we know in present era everything is based on digital technology. Nowadays every person is connected with each other by many ways, where most popular communication is internet so it is internet which connects people. This paper proposes an Android based solution to aid parents to track their children in real-time. Different devices are connected with a single device through channels of internet. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child's location on real time by SMS. Here, a prototype model (device) is created which is simulation based. The work comprises ARM-7 LPC2148 as microcontroller, along with GPS and GSM module. Embedded C core compile using Keil and virtual simulation check using Proteus 8.1 is done. A server is created which will collect all the data generated by our prototype system and send the same to server using GPRS. A Dummy server will be created by using Filezilla. This device will also have the facility of Emergency help key (SOS), if anyone presses the key, automatic help message will be sent to 3 registered mobile numbers on Server.

**Index terms:** Embedded System, Smart System, Internet, GPS, GSM

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## I. INTRODUCTION

The Internet of Things (IoT) refers to the use of intelligently connected devices and systems to exploit data gathered by embedded sensors and actuators in machines and other physical objects [11]. IoT refers to the ability of network devices to sense and collect data from the world around us, and then share the data across the Internet where it can be processed and utilized for various purpose. The IoT is comprised of smart machines interacting and communicating with other machines, objects, environment and infrastructures. Almost every device today has an embedded processor typically a microcontroller or MCU, along with user interfaces, that can add programmability and deterministic "command and control" functionality. In today's world, over 80% of the world population, including children around the age of eight or seven, owns smart phones. This is due to many reasons. One of them is the remarkable features and capabilities that new smart phones offer especially Android based smart phones. GPS offers outstanding capabilities in locating position and this can be used to develop resourceful application that helps in locating missing or lost children [1]. These days, however, with technology growing at a fast pace, automated vehicle tracking system is being used in a variety of ways to track and display vehicle locations in real-time. In this project we are using the concept of tracking the child instead of vehicle. One device is connected with server via internet. Using that device parents will track their children in real time or women

safety. The proposed solution takes the advantage of the location services provided by GSM since kids carry that device.

## II. LITERATURE REVIEW

*Some of the previous work done is as follows:*

*In 2013 A. Al-Mazloum et.al.* proposed GPS and SMS-Based Child Tracking System Using Smart Phone. This project was developed to aid locating missing or lost children. The architecture of system built on two main components, GPS satellite, and GSM telephony services. Some of these works relies on internet connectivity or a server that has to be up running. The proposed system relies only on two main services, telephony and location, thus eliminating the need for internet connection or a dedicated server.

*In 2013 Takeshi Yashiro et.al.* proposed An Internet of Things (IoT) Architecture for Embedded Appliances. The work differs from other work in that the framework is designed to be adapted to existing embedded systems. The system combined the uID architecture and CoAP to host complex IoT applications.

*In 2014 SeokJu Lee et.al.* proposed Design and Implementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smartphone Application. An in-vehicle device, a server and a Smartphone application are used for the vehicle tracking system. In this work, the in-

vehicle device is composed of a microcontroller and GPS/GSM/GPRS module to acquire the vehicle's location information and transmit it to a server through GSM/GPRS network. The web interface written in PHP is implemented to directly connect to a database. A vehicle's geographic coordinates and a vehicle's unique ID obtained from an in-vehicle device are recorded in a database table and a Smartphone application has been created to display a vehicle location on Google maps.

In 2012 Steven Kendall et.al. proposed Multifunctional GPS Embedded Wrist Device For Runners. We represent a wearable wrist device for runners that is equipped with a GPS chip and programmable features. While running, the device would offer velocity, distance and time measurements at a glance. A button to begin and end a tagged area would also be available so that runners could mark particular parts of their run over which they wish to improve their time. The primary components of the proposed wrist device are as follows: a Microchip dsPIC 33FJ128MC802, a Sparkfun 128x128 pixel color LCD, and the LS20031 GPS chip.

In 2013 Ruijian Zhang et.al. proposed Applying RFID and GPS Tracker for Signal Processing in a Cargo Security System. This paper is about developing a centralized, internet based security tool which utilizes RFID and GPS technology to identify drivers and track the load integrity.

### III. METHODOLOGY

- ❖ In this work, the main focus is on performance of GPS and a dummy server is also part of this project. So how frequently our data is stored on server and how we will get the location in terms of Latitude and Longitude is the main concern.
- ❖ With the help of Latitude and Longitude, we will track the person .
- ❖ Another feature is SOS. The function of SOS is when the person is in critical condition or need any help, by single click person can send HELP message to guardian.

Many types of smart devices are available in the world. Some devices are for personal safety and some are for vehicle tracking. This project is designed to be used by parents and aimed to help locating missing or lost children. The Proposed methodology used is to get the child location

using GPS and send location to parents using GPRS module. It takes advantage of the fact that many of today's children bring smart phones which is convenient for this kind of situation.

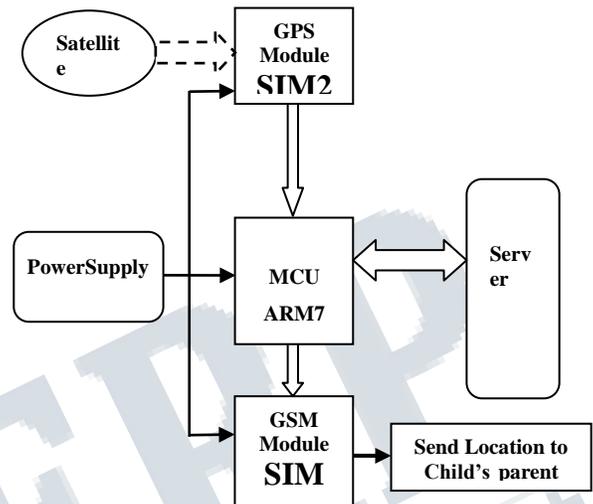


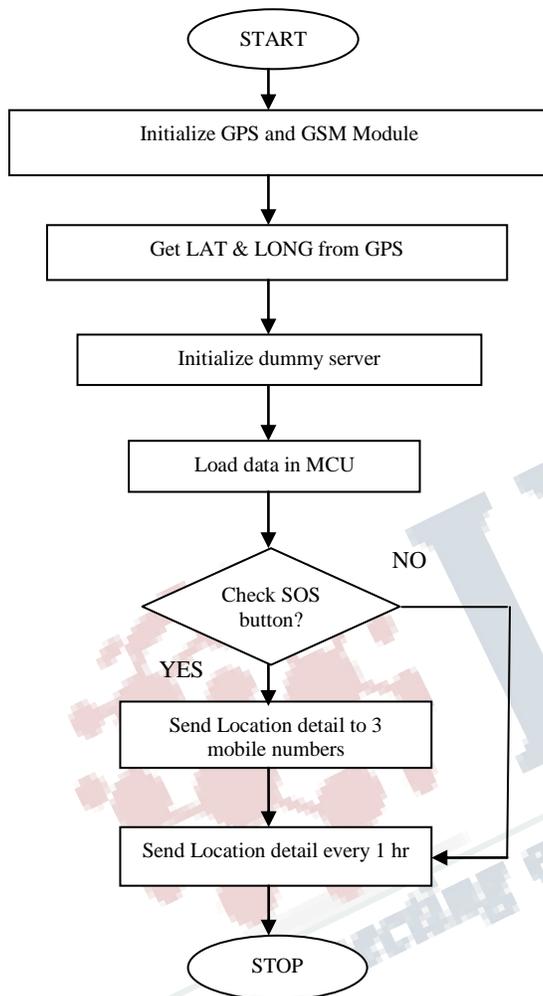
Figure 1 : Proposed methodology

In this work we will use ARM-7 LPC2148 as a microcontroller, GPS module and GSM module. Embedded C core compile using Keil and virtual simulation check using Proteus 8.0. In this thesis we will create one server which will collect all the data which is generated by our prototype system and send to server by using of GPRS. Dummy server will be creating by using of Filezilla. Using this device we can easily do live tracking of any person. This device will also have the facility of Emergency help key (SOS). At the time of critical condition if kid press SOS key so automatic help message will send to 3 registered mobile number from Server.

### IV. SYSTEM DESIGN

In this work, GPS is combined with one of the basic service of a smart phone which is GSM, more specifically SMS, in one system. An application at the parent side will allow parents to send a location request to a child side then retrieve the location from the request reply and shows it on a map. On the other hand, the application at the child's side gathers the necessary information of the smart phone that will be used to locate the smart phone. Information such as GPS coordinates and time are gathered and sent to the parent smart phone that's preregistered on the application. The communication between the parent and the child applications

is done using SMS. It will allow the system to work without the need of internet connection thus allows the application to be implemented on smart phones that don't support GPRS, 2G or 3G internet connectivity. The system sends the location of child to parent's smart phone when the parent wishes to check on the child.



**Figure 2: Flowchart of the proposed method**

## V. HARDWARE SYSTEM DESIGN

In this project we will use hardware components like Micro-controller, GSM module, GPS Module, LCD Display and power supply. Here some components like controller LPC2148, LCD display etc we will use virtually in Proteus 8. **LPC2148** is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many

inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer.

GPRS module is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands. This module supports software power on and reset. This is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM300 module for all its operations. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers. The modem consists of all the required external circuitry required to start experimenting with the SIM900 module like the power regulation, external antenna, SIM Holder, etc.

SIM Com presents a small, high performance and reliable assisted GPS module-SIM28ML. This is a standalone L1 frequency GPS module in a SMT type and it is designed with MTK high sensitivity navigation engine, which allows you to achieve the industry's highest levels of sensitivity, accuracy, and Time-to-First-Fix (TTFF) with lowest power consumption.

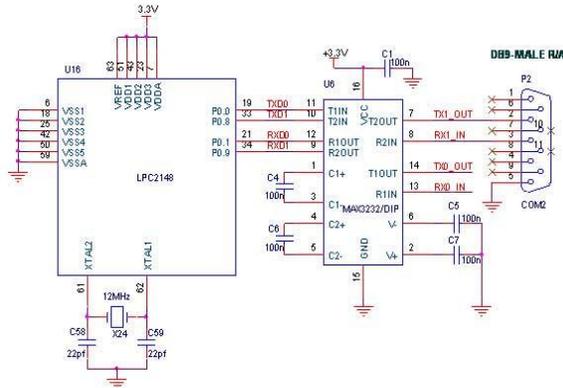
The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply TIA/EIA-232 voltage levels from a single 5-V supply. The microcontroller is interfaced with PC or the GSM MODEM via a MAX 232 to convert TTL logic to EIA 232 or RS232 and vice versa. RS-232 is the traditional name for a series of standards for serial binary single-ended data and control signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

To interface GSM Module with our system you need RS232 to USB cable.

After connecting this cable you have to check COM Port is generated or not in your system. The interfacing of the GSM/GPRS module with the serial port of the computer involves following steps:

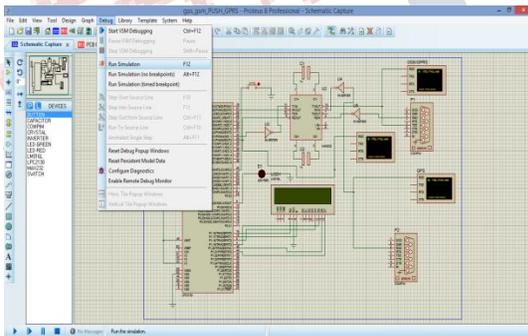
- 1) Connect RS-232 port of GSM module with the serial port of the computer. Insert a SIM card in the module.
- 2) Download Putty software and Open it .
- 3) Select serial option and mention COM port at which GSM module is connected and Baud rate. Then press OK.

The serial data is taken from the GPS module through MAX232 into the SBUF register of LPC2148 microcontroller (refer serial interfacing with LPC2148). The serial data from the GPS receiver is taken by using the Serial Interrupt of the controller. This data consists of a sequence of NMEA sentences from which GPGGA sentence is identified and processed.



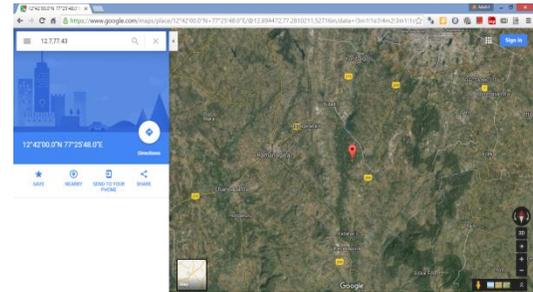
**Figure 3: Schematic of interfacing LPC 2148 and virtual COM (GSM) Port using MAX232**

## VI. SIMULATION AND EXPERIMENTAL RESULTS



**Figure 4: Simulation process**

Here we have implemented virtually GSM and GPS based Tracker system in Proteus 8. We inserted final .hex file in compiler of Proteus. So we can easily analyze the result of implemented system. For watching location of device, we will design one the http link. : <http://neetgps.somee.com/>. Go through above given http link and click on “**Get Location**” button. So it will go to directly google map with your current location.



**Figure 5: Simulated Results**

## VII. CONCLUSION

The solution proposed in this paper takes advantage of the rich features offered in Androids smart phones. This work presents a model which is based on GPS tracker system. Here, ARM-7 LPC2148 is to be used as microcontroller, along with GSM and GPS module. The programming is done using Keil and the simulation check will be done by Proteus 8.1.A server will be created which will collect all data generated by the prototype system. By help of GPRS, same is sent to the server. The main feature of this application is to get the child’s location without its interaction in the process with simple and cost effective method, done by use of GSM and SMS.

Here we are using low cost, high performance and accurate GSM and GPS modules. So final outcome is comparatively low cost solution and performance of device is accurate and reliable. One more advance feature, SOS will work successfully and it will be very useful in critical or emergency situation. Easily parents can see their child’s current location through web version. The proposed system will be implemented, continued, reviewed And improved in a later work.

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