

Long Range (LoRa) Wireless Child Tracking Device using Sensor Network in IoT

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Abstract - In India the number of child abduction cases keeps increasing every year. Every parent expects their child to be safe and hence for the safety purpose they monitor their kids outside the home. They require a privacy space to grow and play independently without knowing that they are being constantly monitored. This issue requires a device which could monitor the presence of the children outside the home. There are other devices like GPS tracker and smart bands to monitor the children by tracking the location quickly and easily. But there will be many disadvantages associated with these devices when it comes with usage. LoRa is introduced as new technology for child tracking in this project and also to overcome certain limitations with the existing project. LoRa- Long Range uses radio as data transmission and can be used to build a location tracking system with the help of IoT. This device helps in monitoring the children by tracking the location quickly and easily.

Index Terms - LoRa, GPS

I. INTRODUCTION

Tracking children can be done for many different reasons. The important reason behind monitoring is to keep the child safe. Child abduction cases are increasing rapidly which under some critical situation leads to death of the child. Children may find it uneasy if a device keeps monitoring them. They require some privacy and space to go out and play. Many devices and android applications have been developed to keep track of the children outside their homes. The android applications developed requires the use of mobile phone and a dedicated internet connection through which the parents can constantly monitor their kids. This technology has been developed enormously in the recent years and led to new versions of tracking the children. Smart watches with GPS trackers, child tracking using mobile phones, IoT based child

tracking system are few examples that are in use. A recent survey on the child abduction cases revealed that the abduction happens to collect a ransom payment from the parents. The Pew Research Centre comes up with a statement that kids are being monitored by their parents using various digital technologies. Around 80% of the children are being abducted for a payment and the digital technologies used like the GSM and GPS are implemented on a mobile phone and if it is interrupted the message will not be sent to the parent and another issue is that child may remove the device and may feel they lack their privacy as they are being constantly monitored by their parents. Considering all these issues WSN is used along with wearable devices to provide better communication and efficiency. Addition to that the child status monitoring can be achieved easily.

II. ARCHITECTURE

A. Literature Survey

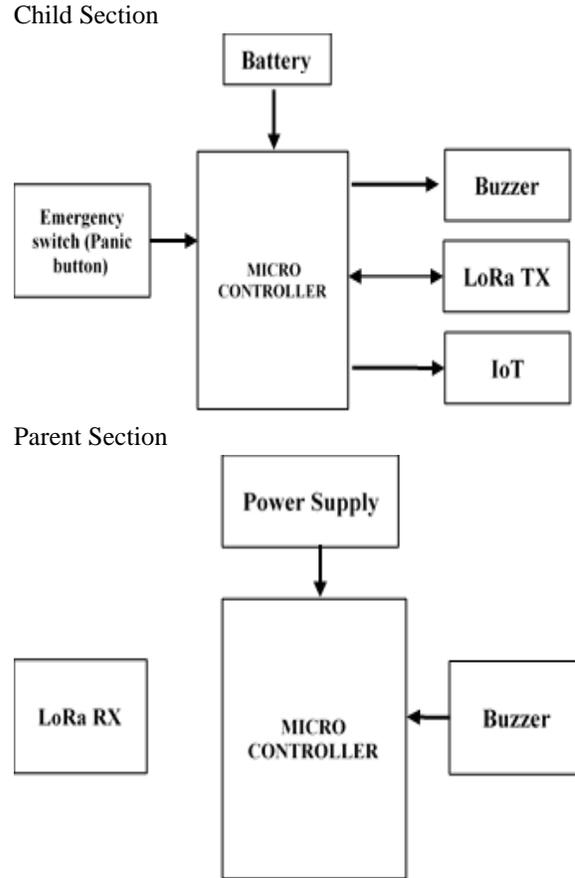
In the past decades, various tracking systems had been introduced and these systems are commonly implemented in the form of child tracking and tracking. One of the existing systems use “Autonomous Clustering technique” for managing groups of Android mobile terminals attached to children in school. Android terminals consist of wireless LAN and Bluetooth device. It takes on Bluetooth communication among Android mobile terminals in every cluster to gather information and cluster head gives the same through tags to server at school using wireless LAN. This system cannot be implemented since children are prohibited from using cell phones and moreover it offers less security. Some systems implemented child tracking using CCMF Framework and track the children with the help of

wearable devices. While some systems used a simple web server approach along with SMS to solve the problem. LM35, flex sensors and MEMS accelerometers are used in certain smart devices to monitor women and children. All this work is considered while designing a new tracking system to overcome all the drawbacks of existing systems and extra functionality can be added to the current and existing system in a simplified and modern way.

B. Proposed Methodology

Low Power Wide Area Network (LPWAN) is a solution to build a network for far enough coverage area and using very small power so the LPWAN concept is widely used to develop the technology of Internet of Things (IoT). In this research, the child location tracking system is built using LPWAN concept that use LoRa module as data location transmission media. In this project we are using Arduino UNO at-mega 328 as the microcontroller. The working bandwidth of LoRa is around 9600 BPS. This project involves the wellbeing and security unit checks. Wireless Sensor Network (WSN) characteristics are used. LoRa transponder and LoRa receiver are used for communication between the parent and child as sender and receiver. LoRa is used along with IoT (Internet of Things) for enhanced security and battery life. IoT provides accurate location tracking and monitoring. This device helps in monitoring the children by tracking the location quickly and easily. LoRa provides better security and battery life when used along with IoT. This project is developed by using LoRaWAN module interfaced with Arduino UNO and IoT. A message notification system is maintained for immediate communication to parent’s number in case if the child tends to take a wrong path or if the child moves beyond a certain km radius or if there is out of communication. The message system is maintained with the help of IoT device. Long Range Wireless Child Tracking Device is exactly built by using WSN (Wireless Sensor Network) in IoT and is a new tracking technology. Additional buzzers and push buttons are used for emergency intimation purposes. This project can be converted into a wearable device as a future enhancement with advanced security encryptions mechanisms.

C. Block diagram of proposed system



III. SOFTWARE REQUIREMENTS FOR PROPOSED SYSTEM

The proposed system makes use of Arduino IDE- an Arduino software that creates an integrated development environment it connects with the Arduino to upload programs and communicate with the hardware devices. The next software used is the Embedded C which is referred to as language extensions for C language. This embedded c is used an extension for embedded systems.

LORAWAN

LoRa is one of the Low-Power Wide Area Networks (LPWAN) protocol which was designed to fulfil the IoT requirements. LPWAN acts as a wide coverage for IoT devices. Lora has many benefits and advantages when compared to other communication

IV. DRAW BACKS OF EXISITING SYSTEM

- Low battery life
- Security issues.
- Smart watches with GPS trackers are of higher technology and children are prohibited from wearing it to schools.
- Most of the schools does not implement the tracking system inside the school premises.
- Use of internet and incase if there is network interpretation it will be very tedious to monitor.

V. ADVANTAGES OF THE PROPOSED SYSTEM

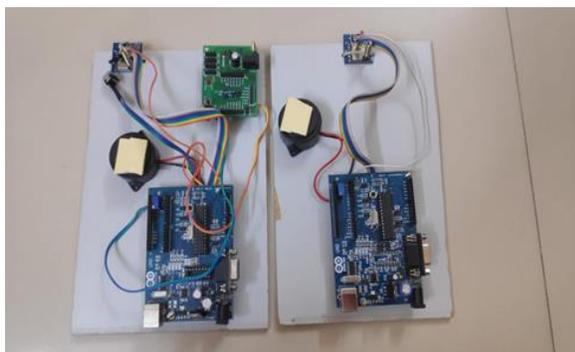
- Enhanced security
- Provides extended battery life.
- The Arduino UNO used is cheap and it is an open-source environment to be featured with hardware.
- The Arduino IDE software used is a user-friendly software since it can be used in any kind of operating systems.
- The Pico buzzer will be used for alarming.

VI. FUTURE ENHANCEMENT

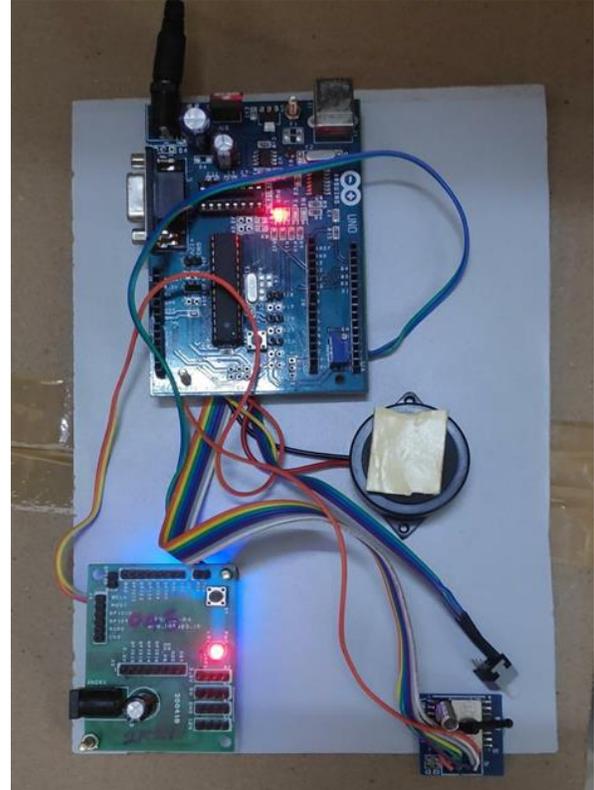
Future scope of this system is that the device can be converted into a wearable device. This wearable device can be attached along with the id card of the children. Another implementation is increasing the radius for tracking. Since LoRa devices uses triangular positions for tracking the latitude longitude and the exact position of the child can be monitored. Further enhancements include the use of advanced encryption and cryptographic techniques with efficient security mechanisms.

VII. EXPERIMENTATION

CONFIGURATION OF KIT



SIMULATION PROCESS



VIII.CONCLUSION

This project demonstrates that LoRa can also be used along with IoT for tracking and monitoring. and It also ensures that this system works provides better battery and security. After including the future enhancement to the system, it will be considered as a new solution to track and monitor children with the help of LoRa.

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