LITERATURE SURVEY ON IOT BASED SAFETY GADGET FOR CHILD MONITORING & NOTIFICATION

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ABSTRACT

Child safety and tracking has always a major concern for parents as the reports of crimes on children are increasing nowadays. With this motivation, a smart device for child safety and tracking is made to help the parents to locate and monitor their children. Today child's safety is a decisive issue for parent's concern. Everyday there is a news of little one being missing. They are being kidnapped or trafficked. Sometime they fall into manhole, borewell or pit. Parents need to take care of their kids while they are outside home, especially the toddlers. The motivation of this topic came from the increasing demand for the safety of little ones from getting lost mostly in the major crowded areas. This paper provide an idea of wearable device for little ones. This device provides us the location details of our kids and it doesn't require a techy person or a smart phone to use it. The objective of the device is to help caregivers to keep an eye on their child in an easy manner and to assist them to find their kids. Presently there are many tracking devices that helps to track their child's activity. However, Wi-Fi and Bluetooth are unpredictable and unreliable medium of communication. So, this paper provides guardians a path for ensuring security of their kids in today's environment.

INTRODUCTION

The motivation for kid safety wearable comes from the increasing need for safety of little ones in current times as there could be scenarios of the child getting lost in the large crowded areas such as parades and festivals. Losing child while traveling and while they go out for hangouts with their friends. This paper focus on the aspect that lost child can be helped by the people around them. This can play a significant role in the child's safety until they are reunited with their parents. Mostly wearable safety devices available today focuses on providing the position or location, movements etc. of the kid to the parents using GPS and GSM. Therefore, chosen mode of communication between the parent and their child is SMS form. Different child safety devices based on Wi-Fi, Bluetooth for Internet as communication mode, GPS and GSM for SMS as communication mode are reviewed in this paper. But both these systems have their own limitations. Wi-Fi and Bluetooth based devices have a major problem of limited range. Also, it is an unreliable means to communicate as there are connectivity issue of Internet in buildings and congested areas. Many of the safety devices available today are not wearable which becomes a major disadvantage with them as there is a chance of getting them fallen.

LITERATURE SURVEY

A. RFID based System for School Children Transportation Safety Enhancement

In this paper author had presented a device to monitor pick-up and drop-off of kid to
enhance the wellbeing during daily transportation from school and to school. In this system there are two main units, a bus unit, and a school unit. The bus unit is the system which is used to determine when a child is boarding or leaving the bus. The information from bus unit is then sent to the school system that identifies the students that haven't board or leave the bus. It then issues an alert message. In this paper author has a developed a web- based and database-driven application for controlling of the device. This application provides beneficial details about the children to caregiver's personnel.

B. Smart IoT Device for Child Safety and Tracking

It provides guardians with the real-time tracking of location, UV radiation index, surrounding temperature, and SOS light with a Distress alarm buzzer for their kids to make people near child to know that child is in panic. It provides feature to locate their kid or alert bystanders so that they can act to comfort the child or rescue the child. In this device they have used Thing Speak, Micro Electro Mechanical Systems (MEMS), NodeMCU, GPS, GSM and Various sensors. This device gives the result for the parent in two different ways. The first one is they get an alert message (SMS) for the registered phone number. The next one is they receive a graphical representation which shows the Latitude, Longitude, MEMS Sensor and Vibration sensor of the child's activities through "Thing Speak". The disadvantage of this device that to use this device there must be efficient flow of internet connection and it must be fullest. Then only it gives the outputs at the earliest otherwise it

takes time for the result.

C. Child Safety Wearable Device

This project focuses communication mode to be in SMS text form using GSM. The parent will send a keyword in form of SMS "SOS", "BUZZ", "LOCATION", "TEMPERATURE" etc., to the devices. The device will reply back the real time accurate location of the child and will also provide the surrounding temperature, or any of the data asked by the parents. It helps parents to keep track if the temperature around their kid is not proper for their kid. The secondary idea implemented was distress alarm buzzer and a bright SOS Light on the device that can be activated by the guardians via sending the keywords in the SMS. Parents can text the keywords to ON the SOS signal brightly and can also send the keyword to sound an alarm which a people near child or bystander can instantly help the child's till the parents arrive. People around could also contact the parents and help them to reunite child with his or her parents. Hence this project provides parents a sense of protection for their kid in today's unsafe environment. The drawback of this system is that parent have to remember the keywords.

D. A Smart Security for Child Safety

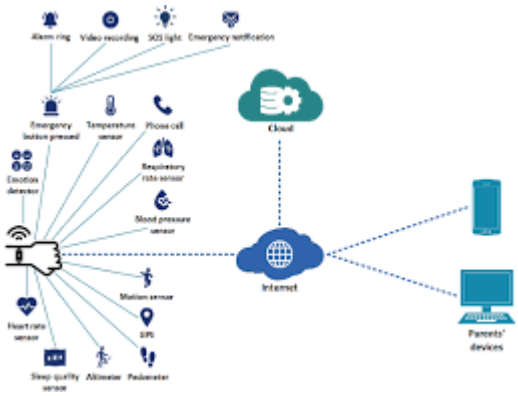
Child tracking is mainly based on two units GPS watch and Android monitoring unit. This wearable device unit consist of a GPS receiver, Flexi Force Sensor, Temperature Sensor and MEMS accelerometer. This security Wearable Device will keep the child safe. The parent will get the continuous update about their child temperature and various other factors, so that they not afraid about their child well-being when they are not with their kid. This would create some fear in the persons mind who are involved in child trafficking and harassment. As a well-known proverb "Prevention is better than cure", this application will act as a prevention for the child safety from harassment and kidnapping.

HOW DOES THE DEVICE WORKS?

Sensors from different devices continuously emit data in the environment about their working state. IoT (Internet of Thing) provides the sensors a common platform to dumb their data and also in a common language so that all devices can communicate. Data release from various sensors is collected and then sent to IoT platform securely. Various sources dumb their data to the IoT platform which perform analytics on it. Valuable information from that data is extracted from data as per requirement. Finally results are shared with other devices and users for further processing. It is the simple process of taking Data from environment and then performing Logics on them. After performing Logics Output is shared with the user.

BLOCK DIAGRAM

The basic block diagram of the system is shown in the figure 2. This system is based on a GSM based SMS communication mode which responds on the particular SMS keyword received from the parents. It consists of a GSM module which is connected to Arduino. Arduino is connected to various sensors and other components. Arduino collects data from the sensors and GPS connected to it and then performs predefined set of logics on it. This gives a required output to the parents on their phones in form of a SMS.



EXISTING SYSTEM

Real-Time Child Abuse and Reporting System In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted peoples. GPS is used to track the live location and it is used when needed.

The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians.

The disadvantage of this project are,

i. The child could not produce the exact alert command during a panic condition.
ii. The command produced may not match with the previously stored command.
iii. This project requires manual intervention

DEVELOPMENT OF WEARABLE DEVICE

The designing of the wearable device plays a major role. To make child wear it on their own willing is by fascinating them with attractive form and ease to wear i.e. it should be a 'Kids Friendly Design'. For 'Kid's Friendly Design', first concern is the how and where to wear, and secondly about weight and size of the wearable device.

Weight and Size of the Device

To fix the size of the device, survey of Kids' body scale is done. The size of average body scale are to be noted. Chest size of 3-year-old kids is 164 mm and of 5-year child is 176 mm. The device should not exceed 100 mm from the chest size in any direction. To know about the weight, many toys that can attached to kids' neck were surveyed. Most of them were between 30 to 50 grams and the toys that can be attached on kids' waist are below 100 grams. According to the 75% mothers in the kindergarten, weight under 100 grams can be applied to their kids.

How and Where to Wear the Device?

To attach on an appropriate position on kids' body, it is a major concern that it should not bother or create problem in kids' active movements. There are various designs of the Wearable Device such as Necklace type, Shoulder Sac Type and Build-in Mock-Ups. To take heart rates, wireless detector is attached on the left side of chest. Then the device should be placed on the right side of chest.

THINGS TO CONSIDER IN A KIDS' GPS TRACKER

It's helpful to understand what features are most vital and play important role in kids' safety device

Ease of Use

It's important for the parent to make sure that tracking device is easy to use for their child and also it should be comfortable.

Non-Removable

It should be taken care that whether they can put it on and take it off on their own or not. It should also be kept in mind that child could remove it from their cloths. So, it Non-removable

Battery Life

The battery life required for these devices is more. The more is the battery life of the tracker is, the more likely you are to leave home without any tension of ending up with a battery that becomes dead very fast.

Comfort

You don't have any chance of locating your kid if they're not wearing it. So, it's the responsibility of the design engineer to make sure that the material should be flexible and non-irritating for skin, as well as adjustable enough to ensure a comfy fit. Hence the device should be comfortable for little one.

Important features for a good Child Safety Wearable device are as follows:

Geofencing

You get extra peace of mind when you can set safety zones and perimeter alerts with a virtual fence. Geofencing makes parents aware about child position or where they're supposed to be It warns parents if they leave the boundaries you've established i.e. boundaries set by the parent or caregiver of the child.

Range

During any outside visit, guardians need a tracker that will work for the range and distance they require. Whether they simply want to track or locate their kid around the neighbourhood or keep eye on them. Keep in mind that devices that rely on only Bluetooth and Wi-Fi have limited range and connectivity issues, so Bluetooth and Wi-Fi based devices are best for close-proximity tracking as on increasing the range between parent and kid communication becomes unreliable.

Alerts and Notifications

Many GPS based devices come with the different notification and alerts settings. Some location updates are very fast i.e. let you check in every 10 seconds and some of them are slow i.e. it took five minutes or more. d. Panic Button If the child is lost and scared, all he has to do is press the SOS or panic button. It immediately let the parent and other saved emergency contacts know that the child need help. But the panic button should be at hand reachable distance . This feature can make both parents and their child feel safer and protected.

Real-Time Tracking

When guardian wants to know where their child is right now, there is not a single moment they wanted to spare. If monitoring your child in real time is important, then wearable you choose should be good enough to offer you real time data and delivers it reliably at the earliest.

Indoor

Use It becomes difficult to get a good read on position or locations when child is inside any buildings as there are so many floors. So parents look for a device that meets their needs for indoor tracking, especially if their child will be spending his or her majority of the time inside the house.

CONCLUSION

This paper reviewed the smart child safety wearable devices. Firstly, various systems and devices available are defined. Basic child safety device comprises of a GPS, GSM, Arduino or any other Microcontroller, Panic button and the sensors to keep the track of child's movement, position, temperature etc. Design of the child wearable device is key factor for making the child wear the device happily. There are some important things to be considered like the limited range of devices, wearable or not, Battery life and the most important the cost.

FUTURE ASPECTS

The problems with the already existing system reviewed are limited range as they are either Wi-Fi or Bluetooth based. Many available devices are not wearable and are too costly for a common man to afford. Battery life of the devices is major concern for the devices. The child safety devices must be non-removable in order to track child activity without child interventions. So, all these points should be considered in future devices.

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