

Smart Child Guard:

A Safety Wearable Device for Children

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Abstract: The smart wearable device for little children is the main concept and it's very important in today's world. There is lots of issue related to child safety and security. The purpose of this paper is to assist parents to detect their children and provide more security. There are many existing wearable device for the security purpose, which are used to detect the day to day act of children only through WIFI and Bluetooth services. But the WIFI and Bluetooth appear to be a weak approach of communication between the children and parents. This paper describes about wearable device for child safety via SMS as the mode of communication, the parent sends the SMS to the GSM module to know the exact location of the child. With the help of GSM module allow us to send and receive SMS. Parent can send the SMS in keywords such as for the LOCATION its LOC and for the TEMPERATURE its TEMP etc., also we add some module like SOS light, Alarm BUZZER, UV sensor to reduce ultraviolet radiation, Temperature sensor to calculate the surrounding temperature and GPS sensor to detect the location of child on Google map.

Index Terms - Children, Compact, Safety, Geo-Location, GSM, Sensor, Auto-Answer, Heartbeat Sensor

I. INTRODUCTION

The Internet of Things System (IoT) allows devices and systems to control remotely that stay interconnected with real world sensors and actuators to the Internet. IoT involves a numerous variety of devices such as home automation systems, wearable devices, smart cars, even human implanted devices and lighting controls many other (V Lavanya et al, 2019).

Now days there could be situation of child getting lost in the major crowded areas and number of kidnapping cases. The purpose of this paper is to show you that how we can help each child in a number of ways. Most of the wearable device accessible in current time is fascinated on providing the location, activity, etc. of the child to the parents via Bluetooth and Wi-Fi. It seems that to be Wi-Fi and Bluetooth is very undependable source to transfer information. Therefore, it is deliberate to use SMS as the mode of communication between the parent and child wearable device. The base of this enterprise to be based on is the Arduino Mega microcontroller board based on relying on the ATmega328P and its embodiment with GSM module just as the GPS module for different dispatch and receives SMS, calls and connecting to the internet which is provided by the Arduino GSM module using the GSM network. Also, there are few ancillary modules from the future scope of the certification such as heartbeat and blood group (P. Nandhini et. al, 2018)(Rajkumar et. al, 2018).

This also sends you some important alerts so that you can take an immediate action on that movement. This also gives you additional information like a blood pressure, blood group and heart beats of a child for their particular identity. In case if the child gets separated from parents, then they can recognize it by live location where in uppercase, which is denoted by LOC for location its shows much more accuracy of it. It also has some additional accessories which can detect a temperature, and also we have inserted an alarm which will run after some information is passed by parents these helps in noisy areas (H Moustafa et. al, 2015)

For example, if a child got lost for finding its parents can send a message to a device, then it glows a SOS light which is universally none as required help. If a person across the child will also get to know that child disturbed from his parents. And also extra additional in that if parents send a BUZZ message to it, then it will start ringing and at some point they get to now an accuracy of a child. And at some point of time it is low cost, lightweight wristband. It works on multi-sensor Arduino micro-system and a low power Bluetooth. There is also one more which is known as vital emergency (F.A Silva et. al, 2014)(K. Bram et. al 2015). The main thing of that vital band is that this uses a Bluetooth for communication in between child and parents. Like this there are so many they are Mimo, Sproutling, and iSwingband. But these, all we don't go beyond much distance so they are not more trusted to ensure the parents. There for wearable device is better than all these and also good for communication in between child and parents and it Assure. And you can also do customization in it by new programming for new certain thing what you like.

A. Merits and Demerits:

- Staying connected and it reliable.
- Data accuracy in location service (to 10 m accurate)
- Efficiency as it uses GSM module in-place of bluetooth /Wi-Fi which eliminates distance barrier.
- It can be used in any of the cell phone and does not require an expensive smart phone (which has GPS basic module).
- It has a big-time scope to be compact to a very minute size(industrially) and practically can be implemented for real time applications.

II. LITERATURE SURVEY

In this draft, it sheds light upon how the Arduino Technology (“model specific name”) work and the mechanism to carry out the given objective of idea.(Vishvanathan et. al, 2014)(Zhigangao et. al, 2017) As Arduino is used on large scale considering it is easy to learn but at the same time it is quite tacky during the implementation phase. Due to appreciable modifications and plugins in different programming languages such as C, C++; there is an impressive leap about the way a Arduino microcontroller can functions in terms of a structure of ‘create – remove –recreate ‘ at any instance of time. So as the objective suggests the utilization of different modules amalgamated with the main microcontroller board (Arduino) (Jatti et. al, 2016)and hence can be technically implemented with a group of insights on an efficient way to put together the knowledge acquired and crafted from the understanding we gain from the insights observed for Arduino project. Moreover we get a general view of the formulation on an Arduino UNO module which gives an information acquisition for the idea behind it and the implementation of Arduino (Sonali et al, 2020).

This document also focuses on the base terminology which is being implemented i.e. IoT (Internet of Things), which evidently has wide spread in the area of automation(Dorsemaine et. al, 2015). So as a quick dossier, it would be “an ecosystem where smart objects are interlinked to each other so as to create and sense the data of environment and communicate with each other, during the process where all the necessary information is combined and will eventually lead to a call of action on the environment or the objects itself which drives us to the decision making process”(Gopinadh et. al, 2018).

The idea of a wearable device for kids or any particular age group per se is conferred in this paper. The vital factor which this device offers is it can be operated by any remote device (in most cases a basic mobile phone)(Y A Badamasi et. al, 2014). The core purpose for the gadget is to provide a service for the target audience which in most instances are the working class parents or guardians to locate the kids in any kind of disaster or emergency, whenever there is a sign of any emergency per se without any casualties. Considering the current situation in market, there are numerous devices which assist users with various functionalities which uses variety of bio-sensors. But to be very specific, the objective targets a very niche area of applications and hence can be utilized and be used with Wi-Fi and Bluetooth segments of technology which can explored in the future scope.

III. PROPOSED WORK

This is a kid wearable device made using IoT. This wearable device is well equipped like an IoT device. It is useful for other things besides the necessities of life of the parents. This gadget retrieves the actual location, the surrounding temperature of the kid. If the temperature around a child is higher than the room temperature, the alarm turns on, so he gets security. Gadgets are not harmful to any child. In this, we have controlled the radiation using a UV sensor. We will use things like lilypad or Arduino to make it wearable and improve security. Similarly, an effective model will be made which will be suitable for battery use.

Cellular GSM networks are connected to cell phones as well as other components as shown in Fig. 1. GPS, SIM 800, and temperature sensor interface with Arduino. Different components are interconnected in the project. This architecture is flexible to use. This system will save time. The interface plays an important role in the system where we need to take the data and response prompt from the environment. Data processing can only be done if that person or user is authentic. A certified person can operate on that data. Once the corresponding process is identified, the interface comes into play, where it interacts with Arduino, and the input is provided in the GSM model. If it provides input for actual location information, then the GSM model retrieves information from the GPS model to Arduino and then sends this information via message to the messaging app of that user. The same mechanism is used for temperature and alarm. For this particular phase, different functionality is embedded, such as auto performance calls, temperature trigger alerts, and more. In a future system, we will implement authentication parts using the blood group, blood pressure, and heart rate.

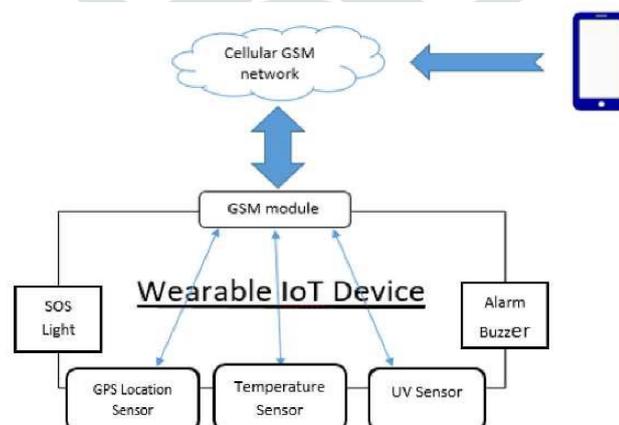


Fig. 1 Proposed System

IV. PROCEDURE

Cellular GSM network device gives you permission to send and receive SMS. It provides an auto answering feature and if any parent calls, it will automatically receive the call. GPS is associated with Arduino to find your child's actual location. We use a temperature sensor DHT11 to check the surrounding temperature. In this, we have used an alarm. We have set a temperature limit that will be equal to our room temperature and if the temperature goes above that limit then the alarm we set will turn on. The battery is used to run the device.

A. Mathematical Model:

$S = U, I, O, P$

Where,

U = set of users which will use device

$U_i = \{u_1, u_2, u_3, u_4, \dots, u_i\}$

Where $n > 0$ = Foreg. Parents

I = set of inputs to be provided

$I_j = \{i_1, i_2, i_3, i_4, \dots, i_j\}$

Where $n > 0$ = Ex. GPS sensor, Temp and Humidity sensor

Output = {Successfully located Child, Successfully retrieve temperature }

P = set of process

$P_i = \{p_1, p_2, p_3, p_4, \dots, p_i\}$

Where $n > 0$

Maximize $O(i_1, i_2, i_3, \dots, i_j)$

Subject to :

$$\sum_{j=1}^n P_{ij}$$

V. TOOLS USED**A. GPS Location module:**

You have used a location sensor to find a continuous location. GPS position sensor gives you the exact address and exact location. Using the GPS sensor, parents will find the exact location of their child. If the parent gives input to the GSM module for location information, then the parents get the actual location in the form of URL. Then it is sent to parents via message. That message is a URL and if you tap on it automatically it shows you the direction through google map.

B. Alarm Buzzer:

This feature is used when the child goes to a shopping mall, zoo, or any other crowded place. Sometimes children go to crowded places with their family and when they get lost, their parents can use this feature to find their child. This module is activated when the keyword message "BUZZ" is sent from the cell phone. When the module is activated, a loud alarm sounds and it helps family members to find there child. If the temperature is too high in summer, it is a risk factor for young children. If the temperature goes above room temperature, the alarm will turn on and alert the people around that child. This feature is used to provide security to children.

C. Sending SMS and Auto Answering:

A parent sent SMS as a keyword "LOC", "TEMP", "BUZZ" then device reply back as a current location of the child and as well as the surrounding temperature of the child. When parents send the keyword "BUZZ", the alarm will be activated automatically. This SMS module will send actual information to parents with the help of SMS800. In critical situations, if the parent calls, it will be automatically received with the help of the auto answering feature.

VI. RESULTS AND DISCUSSION

Parents receive an alert message which includes details of the child as shown in fig. 2 and fig. 3. This message includes longitude and latitude details so that child can be traced.

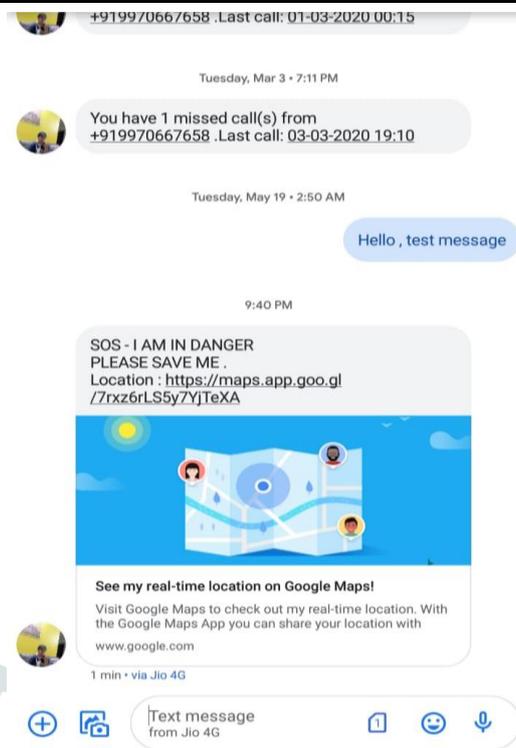


Fig 2: Result

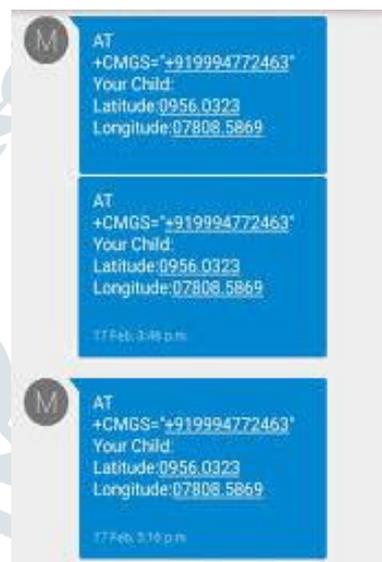


Fig 3: Result

VII. CONCLUSION & FUTURE SCOPE

In this project, we have made this smart device using various components. This smart device is beneficial for parents. This smart device lets parents know about their children's current temperature, location, and more. In this project, we can give it a more distinctive look using more variation. We can offer advanced features to this smart device. With the help of this device, parents know the environment around their children. The chip we make can fit anywhere. We can fit it in identity cards, shoes, and so on. In the future, we can use different things like this android application, camera, and authentication with data storage.

B. Android App:

We can use this concept for automation. Whenever a query is sent the system so that the user can get the same response. This requires the module to be hosted throughout the period. Relative serial ports are required. It is a full-time and online service. The chatbots sever makes this extensible service available to the user.

C. Camera module:

This is an implementation module through which clear communication can be done. We can use a small amount of SMS so that we can use this camera module for visual interaction. SMS has a non-visual interface so it's easier for you to communicate with the camera module. To use the Camera module, a specific input text will be sent; That input will be sent from your user's phone to the GSM module, and then the GSM module will make a camera through Arduino UNO and save a brief picture on the Mega and save a few pictures on the external microSD card. The Arduino module will then see the sparsed pictures from

SD Stockpiling and then they will be moved to the GSM module and then the GSM module will send it to the client with the help of SMS.

D. Authentication with data storage:

The major part of authentication deals with the initial stage, in which n number of users are licensed to call the device sim and the user's data needs to be stored. Considering the loss of Ardiniuo data handling, an external data source is needed and the main embedded board must be connected. A scope that ensures that this full proof system without other flaw is expanding in the medical section where we can check heartbeat, blood group and blood pressure where you can ensure the identity of children so that no one is misusing your device.

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