# Smart Child Safety Wearable Device

Bannuru Ranjeeth [1], B. Srinivasa Reddy [2], Y. Manoj Kumar Reddy [3], S. Suchitra[4], B. Pavithra [5]

[1,2,3,4,5] Department of Computer Science and Engineering., Hindustan Institute of Technology and Science, Chennai, India

*bannururanjeeth1201@gmail.com[1], timmusudheer007@gmail.com[2], manojyerasi@gmail.com*
*[3],ssuchitra@hindustanuniv.ac.in[4],bpavithra@hindustanuniv.ac.in[5]*

*Abstract*— **Child security is the foremost common issue emerging around the world. There are numerous issues to youngster security and this work primarily manages kid security from the dangers like missing, abducts. The Technical point of this task is to have an ordinary correspondence between the kid and parent through the gadget which helps in finding the area, pulse and temperature of the kid utilizing the gadget empowered with the pulse sensor, temperature sensor and GPS tracker. This gadget empowers association between the youngster and parent through the WIFI module cooperation utilizing IoT. The parent can get to the kid data intermittently by interfacing through this gadget. This makes guardians defend youngsters even in their nonattendance. The data is stored into a cloud permanently to keep the track record of old data of the children for further reference. The sensors are activated automatically when they are subjective to the miscellaneous activities**

*Keywords—Child Safety, WIFI module, IoT, Heart Rate Sensor, Temperature Sensor, GPS tracking*

## I. INTRODUCTION

Child safety and improving kids wellbeing are the prime concern in this project. The work of guaranteeing kids most habitually falls to gatekeepers and caregivers, and it is up to them to familiarize themselves with security threats in and around their homes and communities. Once you know the perils, you will be able to take steps to orchestrate for security. The reality is, each capable parent is concerned around their children's security. At the same time, kids must socialize at a youthful age and be able to have a certain level of flexibility to develop and create independence [10]. So this made us develop a system that gives confidence to the child and the parents. They can send their kids to the school or playground and parks with friends. This also gives kids some motivation from a younger age to not to highly depend on parents whenever they are going out or school. They can happily play with friends and neighbour around the park and ground.so this system will help the parents when the child is misplaced or seized[6].

The centralization of this paper is to have an SMS substance locked in correspondence medium between the kids wearable and the parent as nature for GSM helpful that correspondence is displayed all over all through the place. The parent can send a substance with particular catchphrases, for occurrence: region, temperature, UV, SOS, buzz and wearable gadgets will answer back with a substance containing the reliable cautious zone of the youth which after will give applications.[1] The kid security contraption is prepared for going around as an able IOT contraption it outfits gatekeepers with the steady range, enveloping temperature, UV radiation list and SOS light nearby inconvenience caution chime for their kid's environment and the capacity to discover their kid or caution by sanders in acting to ensure or consolation the youth. The sharp adolescent prosperity wearable can be progressed impressively more in future by utilizing especially negligible Arduino modules, for illustration, the lily pad Arduino which can be sewed into surfaces. Furthermore, a more drive beneficial demonstrates ought to be made which can be competent for holding the battery holding for a longer time. Suraksha, it portrays that the contraption can be prompted by three diverse ways in specific, voice, switch and daze. The contraption when not being utilized shot with the objective that the pointless signs are not sent. For opening it, an essential voice heading is satisfactory when the contraption is hurled with the control, utilizing control sensor it'll begin working that's it'll send the zone to the police and inconvenience message to the enrolled flexible number is shown in Fig 1.
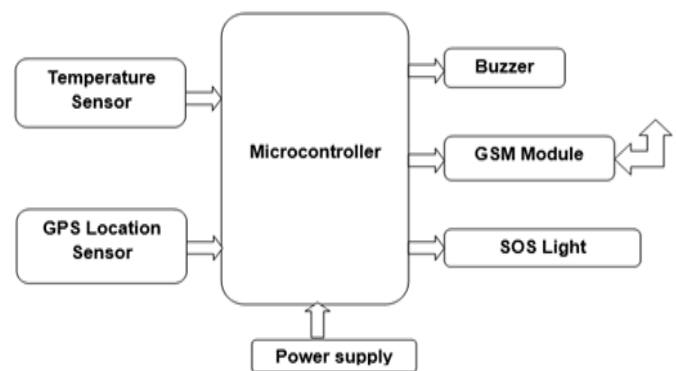


*Fig 1. Existing Working Model*

The working of the contraption related with the decorations which make an impression on the person when the interesting control is connected which takes after capture, this records a voice message. This contraption is embedded with the jewels. In any case, getting to the capture at genuine hazard and sending a prepared message through account sound is the principal disadvantage. [3]Well being and security in open transportation dependent on open observation in creating nations presents the higher danger of security and security since there happen to be more traveller in a single-vehicle .the

issue turns out to be more regrettable in creating nations, on account of the absence of reasonable and coordinated methodologies.[14] The point of this examination is to investigate the view of security issues of those gatherings engaged with the activity of open transportation. This recognition is utilized as a base to create an improvement plan for the setting of creating nations. The examination utilizes a poll review to gather discernment information[4].

## II. RELATED WORKS

The existing framework attempts to deal with a systemic problem that has destroyed the lives of countless young people and their families. The device displays the person wearing it regularly, the knowledge being available worldwide encouraged by the advantages of the distributed computing. Therefore, the information could be downloaded for evaluation and analysis onto any remote station [13]. It does require advanced cell and web in any case. This task is to have an SMS content-enabled medium for correspondence between the child's wearable gadget and the parent as the essence of GSM flexible correspondence is present throughout. The parent should send out a book with clear language (example: area, temperature, SOS, BUZZ, and so on). At that point, the wearable gadget will reply with a book containing the exact area of the child which, after tapping, will give headings to the area of the child on the Google maps application and will also give the overall temperature, the UV radiation list so that the guardians can follow when the temperature and UV radiation is in the application.[fig 1] The alternative intervention used the individuals present in the youth's comprehension right now, who could respond immediately for the well-being of the kid until the guardians show up or they could call the guardians to help find them. The auxiliary test carried out was utilizing a brilliant SOS Light and trouble alert bell presents on the wearable gadget which when actuated by the guardians using SMS material will magnificently show the SOS sign and sound an admonition that an onlooker can as a pointer of uneasiness without quite a bit of a stretch spot. Along these lines, this endeavour expects to supply watchmen with an assumption that in the here and now everything is acceptable and useful for their youngsters.

## III. PROPOSED METHOD

An electronic system proposed in this paper has the following objectives: i)The device is made to switch on by the child to track or store the child data. ii) The data is stored in a cloud over a WIFI network which can be seen for many days. iii) The data helps us to know the child previous location history wherever she goes using GPS. iv)When the child is lost or kidnapped he/she can press the SOS key on the device the gives the alert to the parents or whoever is concerned. v) The device helps us give the live updates of location history by auto-refreshing of location. vi)There is a heart rate sensor included in the device that gives notifications to the concerned people. vii) There is also temp sensor, which gives the update about surroundings temp that is fire, etc.. viii) The above all values are converted to data using microcontroller. Fig 2 shows that overview of the system: Smart Child Safety

Wearable Device. The main objective of this is to stay safe and protected your family and be aware of your beloved ones. The flow diagram explains clearly
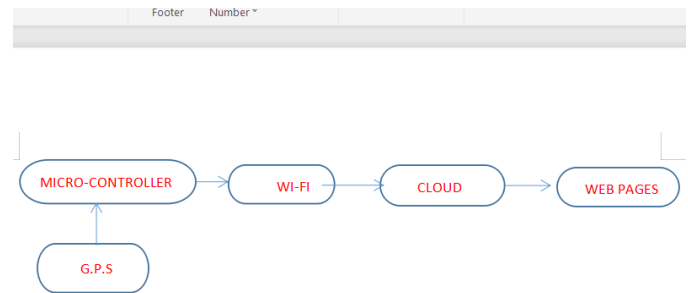


*Fig 2. Flow diagram of the System: Smart Child Safety Wearable Device*

### A) Micro-controller

It is mostly utilized for a wide extent of Uses since it is low in cost and it is successfully available. The Micro-controller utilized right currently is 16F887 working at a speed of 20MHz. This PIC showing like analyzer that will look at a successive sign from the machine and produce a PWM i.e. Heartbeat Width Balance pooled with Electronic Speed Controller (ESC) that has the high current spec to control high power motor.The working voltage expected to work this micro-controller go from 2 to 5.5 Volts. It has 35 yield pins. It has 256 bytes of EEPROM memory. The data in it might clarify the hypothesis or think on numerous occasions. It has 368 bytes of Slam memory. It has 14 channel A/D converters and 3 free tickers. This micro-controller is utilized to run computation and control various peripherals of the structure required to arrange the actuators of the lighting framework[8]. The sensor is connected to the micro-controller. By then the Micro-controller separates the got request and a while later plays out the given out task PIC 16F887 is one of the most outstanding micro-controller from Microchip. This controller is extensively utilized for test and current applications considering its minimal effort, the wide extent of employments, high bore, and straightforwardness of availability. It is ideal for applications, for instance, machine control applications, estimation devices, study reason, etc., [5].

### B) GPS

Around the globe, Arranging System uses follower headway to take after the signs. It deals with the standard of 2D trilateration. Right when a thing offers signs to the satellites, satellites resend the input standards back to the article. The time required to offer the input hint is chosen to pick the show up the scope of the thing. GPS Taking after framework uses Around the world Course Fawning System structure to take after the specific locale of the vehicle. Vehicle taking after frameworks have been arranged into two sorts, inactive and fiery framework. Pulled back framework screens the district and stores the information though fiery taking after framework screens and sends data to a focal taking after passageway. In the GPS module, it contains a progressive harbor which is used to interface with the micro-controller. GPS Recipient sends the range information to the controller. Controller gets the information and transmits the information to the customer using a WIFI module.

### C) CLOUD

These days everyone is using the cloud in day to day life in their devices like mobiles, laptops, etc. The good thing about cloud platforms is a reasonable cost, security, high salability, high storage, easy availability. In the proposed system, the cloud stores the child's daily data like a heartbeat, GPS history, temperature history, etc. The data is stored for many days uses WI-FI. Fig. 3. Shows the flow diagram for the cloud storage.
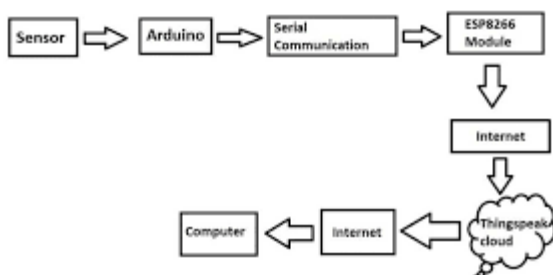


**Fig. 3. Flow diagram for the cloud storage**

### D) Heart Rate Sensor

Heart rate sensor gives regular updates about the child's heartbeat. It gives alert notifications whenever the heartbeat raises up and down. This Heart rate sensor is shown in Fig, 4. For example, when the child faces some misc activities or watches or undergoes serious issues they get scared by that. If they are being followed by someone or if they see anyone looking scary their heartbeat suddenly raises. So It also sends the alert messages to the caretaker if the conditions are critical or suspicious. Both the above data is stored in the cloud. The main motto of this is: Keep family safe and protected.
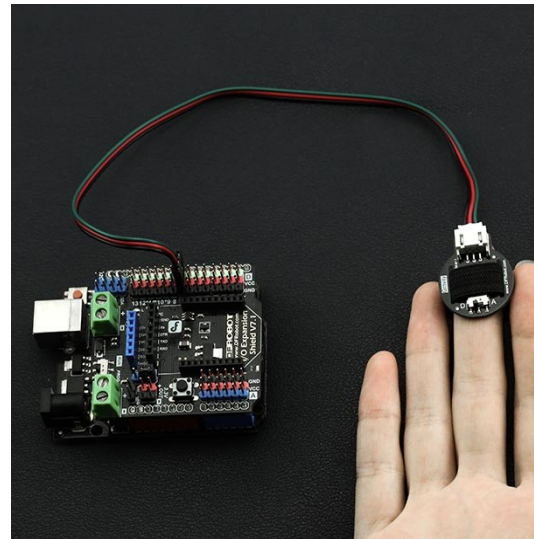


**Fig:4. Heart Rate Sensor**

### IV. EXPERIMENTS

The proposed method is tested on open-source Arduino Software (IDE) makes it simple to compose code and transfer it to the board. It runs on Windows, Mac OS X, and Linux. The earth is written in Java and dependent on Processing and another open-source programming. The Arduino Integrated Development Environment (IDE) is a cross-stage application (for Windows, macOS, Linux) that is written in capacities from C and C++. It is utilized to compose and transfer projects to Arduino good sheets, yet also, with the assistance of outside centers. Fig 5. shows that the GPS Tracking and Temperature Sensor.



**Fig 5. a) GPS Tracking  b)Temperature Sensor**

*Fig 6. GPS Tracking System*

### E) Temperature Sensor

The Temperature sensor gives the surrounding environment temp conditions whether it's cool or heat conditions subject to environmental conditions. For example, if the conditions are very hot and they are under any fire threat or stored under any surfaces. The flow works whenever the child faces the above consequences the parents will automatically get the notification through SOS enabled option through controllers where the system is built with the temp sensor hardware. The image of the temp sensor is shown in 5.b.

### F) GPS Tracker

GPS tracker deals with finding the exact location of the child through the cloud from the parents. It is shown in Fig. 6. It points the location and sends to the cloud and through cloud domain parent or officials can get access. And the temperature sensor sends the exact temperature at the child's location so that the child is in a safe place or not can be known.

*Table I. Personal Data from Several Incidents*

| Timestamp | Heartbeat | Temperature | SMS Alert |
|-----------|-----------|-------------|-----------|
| Incident 1 | 70 | 17 | Body Temp |
| Incident 2 | 69 | 19 | Heart Rate |
| Incident 3 | 65 | 15 | Body Temp |
| Incident 4 | 68 | 14 | Body Temp |

The values are real-time values which are noted by assessing the conditions and situations. The values obtained after testing with hardware system. Table I. shows the real-time assessment done at various locations. From the table, the

details of the child can be known i.e. health details are known as well as temperature based on the condition.

*Table II. Geographical Data from Several Incidents*

| Timestamp | Latitude | Longitude |
|-----------|----------|-----------|
| Incident 1 | 13.10 | 80.10 |
| Incident 2 | 13.15 | 80.15 |
| Incident 3 | 13.25 | 80.25 |
| Incident 4 | 13.40 | 80.40 |

In the case of the location details, the real-time assessment values are assessed and stored. Table II describes the exact latitude and longitude location of the child. From the graph, the fluctuations can be known due to the variation in the latitude and longitude values. Fig 7 shows that Geographical Data (Latitude and Longitude) from several incidents.
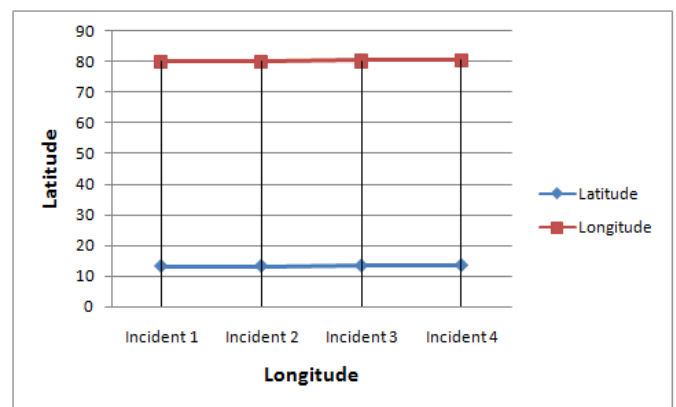


*Fig 7. Geographical Data (Latitude and Longitude) from Several Incidents*

### V. RESULTS AND DISCUSSION

As many hardware components are being used and some software for storing and analyzing data the accuracy will be near the to the expectations. The results could be satisfying and will be a worthy product for the parents. The performance is because of the code written with good complexity like both time and space. As a developer got faith and confidence that have designed something which will be essential for the caretakers nowadays and will help them in giving not only results but also happiness when the kids return home safely.

## VI. CONCLUSION

The project undertaking would help in improving the wellbeing and security of children. This will help the authorities to solve the child missing cases easily. It will improve social security as well as parents' insecurities. This project will reduce crime rates in society. This takes low cost while implementing and building so that everyone can afford this. Everyone in this era using smart devices and gadgets which will be helpful for the parents to use IOT based device. This IoT based device brings a revolutionary change in the current problems regarding child safety issues. Child safety is the most common problem in the world. By this project, the child missing and kidnap issues can be brought down and help the society.

## REFERENCES

[1] AkashMoodbidri, Hamid Shahnasser, "Youngster safrty wearable device", in IEEE Xplore, June 2017.

[2] Jonnadula1, Bhanu Prasad Davu, Hari Kishore Kandula, VinodDonepudi, sivaiahEtukuri, Gopinadh, "Child security wearable gadget", VVIT, Guntur, Andhra Pradesh, India. Global Journal for Research in Applied Science and Engineering Technolgy(IJRASET). Volume 6 Issue 2, February2018.

[3] Jatti, Anand and Kannan, Madhvi and M Alisha, R and Vijayalakshmi, P and Sinha, Shrestha, " Structure and improvement of an IOT based wearable gadget for the wellbeing and security of ladies and young lady youngsters", 2016.

[4] Asmithapawar, Pratikshasagare, Tejalsasne,kiranshinde,"Savvy security answer for ladies and youngsters wellbeing dependent on GPS utilizing IOT", International Journal of ongoing advancement in designing and research, Volume2,Issue 3, march 2017.

[5] Saranya, J., and J. Selvakumar, "Usage of youngsters following framework on android portable terminals," in Communications and Signal Processing (ICCSP), International Conference on, pp. 961-965, IEEE, 2013.

[6] SeokJu Lee; Tewolde, G.andJaerock Kwon, "Structure and implementation of vehicle following framework utilizing GPS/GSM/GPRS innovation and cell phone application," in Internet of Things (WF-IoT), IEEE World Forum on , pp.353,358, March 2014.

[7] R.K. Pateriya, Sangeeta Sharma, "The Evolution of RFID Security and Privacy: A Research Survey," in Communication Systems and Network Technologies (CSNT), 2011 International Conference on, pp. 115-119. IEEE, 2011.

[8] AkashMoodbidri, Hamid Shahnasser, "Youngster security wearable gadget," in IEEE Xplore , June 2017 .

[9] B. Dorsemaine, P. Gaulier, 1. P. Careful, N. Kheir and P. Urien, "Web of Things: A Definition and Taxonomy," Next Generation Mobile Applications, Services and Technologies, ninth International Conference on, Cambridge, 2015, pp. 72-77. 2.015.

[10] H. Moustafa, H. Kenn, K. Sayrafian, W. Scanlon and Y. Zhang, "Versatile wearable interchanges [Guest Editorial]," in IEEE Wireless Communications, vol. 22, no. 1, pp. lO-l1, February 2015.

[11] K. Vidyasagar, G. Balaji, and K. Narendra Reddy, " RFID-GSM imparted School children Security System," in Communications on Applied Electronics, Vol 2( 2): pages 17-21, June 2015.

[12] www.ijsdr.org

[13] P. Santha Raj, V. Anuradha, "Structure And Implementation of Children Tracking System Using ARM7 on Android Mobile Terminals", International Journal of Scientific Engineering and Technology Research, ISSN: 2319-8885, Vol.03, Issue.21, Sep-2014.

[14] A Jyothi, AlapatiSrimaithri, Anusha P, AvulaSindura S, Santhosh Kumar S, "Advancement of Wearable Device for the Safety and Security of Women and Children", International Journal of Scientific Research in Computer Science, Engineering and Information Technology, Volume 4, Issue 6, ISSN: 2456-3307, 2018.

[15] A. Al-Mazloum, E. Omer, M. F. A. Abdullah, "GPS and SMS-based Child Tracking System using Smart Phone", International Journal of Electronics and Communication Engineering, Vol:7, No:2, 2013.

[16] Rita H. Pawade, Dr.Arun N. Gaikwad, "Android-based Children Tracking System", International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 6, June 2015.

[17] M. Pramod, Ch V. UdayBhaskar and K. Shikha, "IOT Wearable Device for the Safety and Security of Women and Girl Child", International Journal of Mechanical Engineering and Technology (IJMET), Scopus Indexed, Volume 9, Issue 1, pp. 83−88, January 2018.