

Child Monitoring and Safety System Using Wsn and Iot Technology

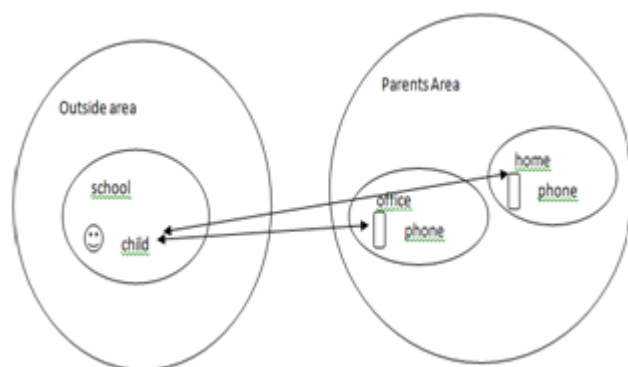
P.Poonkuzhlai¹, R.Aarthi², Yaazhini.V.M³, Yuvashri.S⁴, Vidhyalakshmi.G⁵

¹Associate Professor, ²Assistant Professor, RMD Engineering College, Thiruvallur, India, ,
poonkuzhali.ece@rmd.ac.in¹, aarthi.ece@rmd.ac.in²

^{3,4,5} U.G Students, Department of Electronics and Communication Engineering, RMD Engineering College

ABSTRACT - This paper presents the design and implementation of a portable IOT-based safety and health monitoring system for children through a sensor embedded health monitoring device for safety and emergency services. It is known that the technological advancements are increasing at a faster pace. But the utilization of technologies in various sectors is very low. We know that people of different age group faces different difficulties. But the security for children's is very low. There is lot of cases registered regarding child safety.

Nowadays, the schools and the parents are very much worried about their school children's for school transport and other places. So, the safety and monitoring the school children is very much difficult. In this project we are introducing the IOT based embedded system is used in this project. So we propose a system to continuously monitor the parameters of the child and also their location for safety purpose. The system provides smart child tracking and monitoring system.



Keywords- Internet of Things(IOT); Face recognition; Health Monitoring; Sensor ;GPS location tracker; Wi-Fi module.

I.INTRODUCTION

The happiness of the parents is the caring and helping the child to grow well in the beautiful world. But children are facing so many problems from the outside world. It may affect the mind to avoid having friendliness with everyone. And parents cannot sit with their children for 24x7 hours to secure their children and monitor the children activities. When a child is going to school, then her security and activities are assured by the school and the members of school only. Although cities can provide more opportunities, they can also present challenges

to the safety of children. There are reportedly more than 200,000 children who die from accidental injuries each year, most are due to drowning, traffic related injuries, and dangerous activities. Parents and guardians thus need ways to better monitor their children, but typical security measures focus on preventing theft or other illegal actions and aren't well suited for monitoring children. Furthermore, parents and guardians don't have permission to access surveillance videos to monitor their children.

IoT in child security system

Now the modern world needs to have the advanced things through composing different technologies for helping to find solutions for their real life problems. The new technology Internet of Things (IoT) provides much support for making advanced devices and tools to design and implement the solutions on the real world life issues. Although some studies have looked into using personal monitoring methods for children based on wireless communication, .We exploit such devices to monitor the location and activities of children and to proactively notify guardians of potential safety risks.

After sending children to school, the parents may get the SMS about the child whether reached the school is not . If the system gets failed in the school, then the parents have made a call to the teacher to confirm about their child present in the school. But this manual approach may not give 100% satisfied results in all the occasions. Hence the tracking sensor may give 100% perfect result to the parents' smart phone about the status and location of their child.

Here we have taken one more problem that the level of people who are near to the child because the health issues of the child cannot be monitored continuously. So, the health of the child and the quality of the surrounding environment of the child should be checked. In such cases, the information can be sent to the parents immediately to enquire about the position of the child.

II .MOTIVATIONS FOR THE RESEARCH

The Android smart phones and wireless technologies promote communications between people. By adding GPS (Global Positioning System) tracking facility with smart phones can help the listener to find the actual current location of the moving object. Mori, Yuichiro, et al proposed ad hoc based android mobile terminals to track and find the location of the children[10].

The ARM7 microcontroller and GPS with Android smart phone features are used to track voice signals for tracing children locations

The children may be suffered by the seizure attacks at any time in their life and it has to be monitored without any delay to help the child. In such situations the wireless sensor with GSM can help to inform the parents or relatives about the current situations of the child. The GSM is playing a vital role in that to deliver the message immediately to save the child by giving proper treatment. D K Kamat, et al designed the above system and implemented the required software for sending messages to the appropriate persons for indicating the seizure attacks over the child

Many smart watches are available in the market for kids care, but most of the parents are not aware and not purchasing those items for their children security . So, awareness is to be given to all parents those who admitted their children in the school. The manufacturing and

production cost has to be reduced for distributing the device to the parents. This helping device will be able to provide perfect response about the kid's physical and mental status. But, all the smart watches and innovations are not enough to secure the child from violence

III.PROPOSED MODEL

The proposed model may provide the perfect solution to track child health issues and monitoring that whether they are fully secured or not in their living place. Here we proposed a model to compose all IoT healthcare ideas with the 'Temperature, Respiratory and Heart beat' sensing module to provide the best application for providing complete care for children. The child can be even tracked by the parents in remote place. It can be done by monitoring child's blood pressure to check whether it gets crossed the normal or acceptable level of a human body and even the location of the child can be reported if it's out of the school range.

- Entry and exit of the child
- Current location of the child
- Respiration rate of the child
- Pulse per minute (PPM)
- Body temperature

Use of various sensors responsible for specific application help to detect and record the biological parameters.

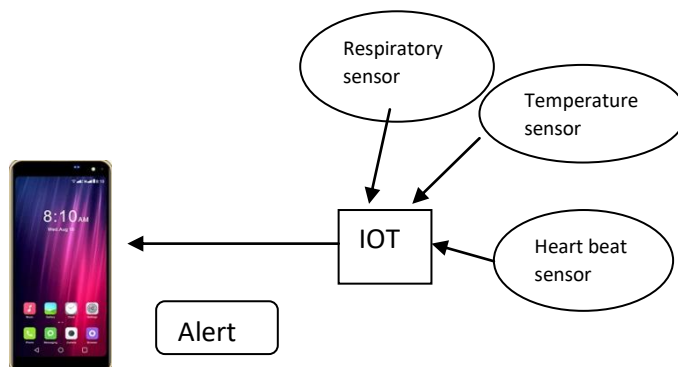


Fig.1. Model for Child Security

Integration of the collected database is stored through IoT and made available to the concerned parents and staffs for their reference. The figure 2 shows that the basic components required for implementing the application for securing children from unwanted circumstances

A. ENTRY AND EXIT OF THE CHILD:

The attendance of the child should be noted to the parents as well as the staffs in the school zone. So, for the purpose of the direct attendance of the children, the proposed system contains the matlab for face recognition and by using this we can also save the information of the child in the cloud.

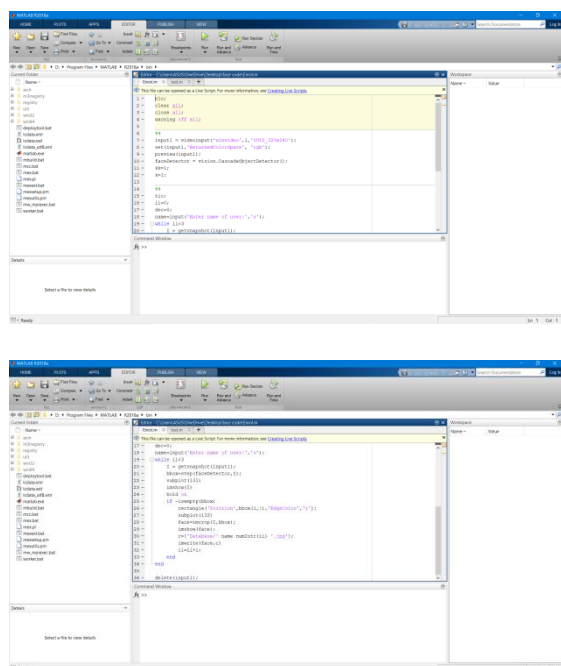


Fig2:MATLAB program to Enrol child details

Face detection is an easy and simple task for humans, but not so for computers. It has been regarded as the most complex and challenging problem in the field of computer vision due to large intra-class variations caused by the changes in facial appearance, lighting and expression. Such variations result in the face distribution to be highly nonlinear.

B. CURRENT LOCATION OF THE CHILD :

The system is built on Arduino and uses a commercial GPS receiver to compute the position of the child continuously. The child's position information is periodically sent through GSM to the parent's smart phone. This can help the parents and the school authorities to monitor the children when they leave the school or they go missing.

C. RESPIRATORY RATE OF THE CHILD:

The Respiration Sensor is used to monitor abdominal or thoracic breathing, in biofeedback applications such as stress management and relaxation training. Besides measuring breathing frequency, this sensor also gives you an indication of the relative depth of breathing. The Respiration Sensor for Nexus can be worn over clothing, although for best results we advise that there only be 1 or 2 layers of clothing between the sensor and the skin. The Respiration Sensor is usually placed in the abdominal area, with the central part of the sensor just above the navel. The sensor should be placed tight enough to prevent loss of tension..

D. RECORDING OF BODY TEMPERATURE:

The LM35 device does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55°C to 150°C temperature range. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. Here, LM35 is generally employed to record the body temperature of the child. Platinum thermistors are

generally not preferred due to their fluctuating characteristics. Body temperature is usually measured in terms of Celsius.

E. MEASUREMENT OF PULSES PER MINUTE(PPM):
 PPM alone is measured and recorded externally. It is a measure of the total number of pulses travelling through any vein in our body per minute. The pulses are detected according to the absorbance and transmittance characteristic of blood, as explained in Beer's Law. PPM values solely depends on emotional behaviour and mood of the patient. The detectors photo current (AC Part) is converted to voltage and amplified by an operational amplifier (LM358).

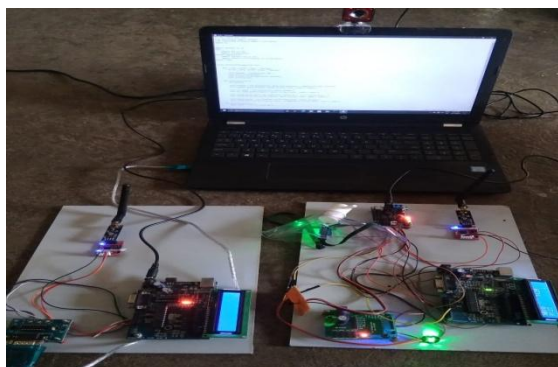


Fig 3: Figure of the whole proposed system

All the recorded digital values from the biomedical PCB and respective sensors are fed as inputs to the PIC16F877.A microcontroller on the embedded PCB. These digital values reach the computers as serial input data and are displayed graphically. Compatibility between the PIC16F877A microcontroller IC (working on TTL logic) and the PC's (working on CMOS Emitter logic) is achieved by means of MAX232(serial USB Cable). Sharing of accumulated data occurs through IoT and health monitoring systems. The parameter is represented and recorded in a digital input manner to facilitate detailed analysis of the child's safety ,security history by entering the attendance in face recognition using MATLAB. Emergency alert signals and abnormalities of the child are immediately indicated through message to the school and family. This helps to monitor children easier and faster

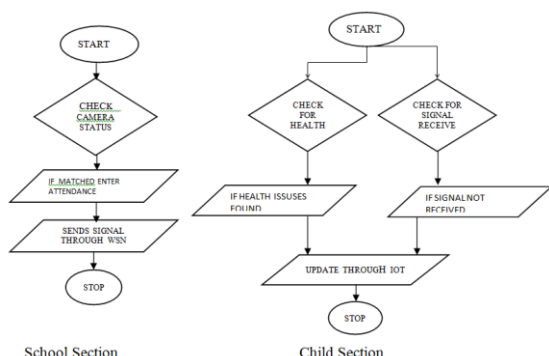


Fig 4. Flowchart

The system will start with enabling all required sensor for tracking the location of the child and status of her surrounded place. The interconnection between these two modules is to

be made for implementing the communication among the modules to provide the expected behavior. All the sensor modules are enabled to track the current situation in child environment. If any unacceptable incident is found then the corresponding respected module will do its task for completing its duty on this proposed system design. The main motive of this proposed model is in tracking the child security from violence and the health status of the kids. Hence, the message communication to proper destination place vital role. In this a small improvement also required to send the alert message only to their parents and caretaker.

III.EXPERIMENTAL RESULTS

The proposed intelligent health monitoring and security system is being deployed and tested over a children whose personal details are stored as a back-end program. The entire database includes various details of the child including the age, sex, name and theresidential address. Programming in MARLAB is a combination of visually arranging components or controls on a form, specifying attributes and actions for those components, and writing additional lines of code for more functionality. Since MATLAB defines default attributes and actions for the components, a programmer can develop a simple program without writing much code. The graphical user interface of the provides intuitively appealing views for the management of the program structure The structure of the Basic programming language is very simple, particularly as to the executable code . MATLAB is not only a language but primarily an integrated, interactive development environment ("IDE"). The MATLAB has been highly optimized to support rapid application development ("RAD").MATLAB is a component integration language which is attuned to Microsoft's Component Object Model ("COM"). It is a simulation software done to reduce excessive space and wastage of cost. It's a high-level programming language

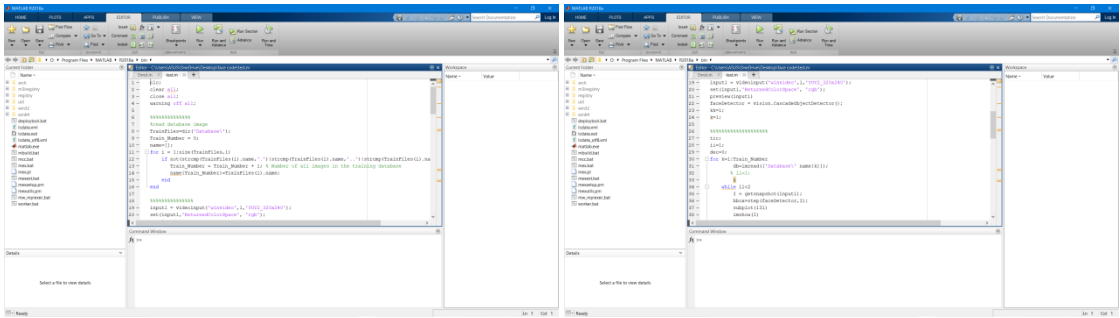


Fig.5.1&Fig.5.2. The various snapshots show the program for testing attendance for face detection

CHANGE TITLE								
13252	22	CHILD ID 1	NAME: YAAZHINI	ENTERED SCHOOL	NA	NA	NA	NA
13259	22	CHILD ID 1	NAME: YAAZHINI	ENTERED SCHOOL	NA	NA	NA	NA
13268	22	CHILD MOVED AWAY	13.0345	80.21244	NA	NA	NA	NA
13272	22	CHILD MOVED AWAY	13.0345	80.21244	NA	NA	NA	NA
13274	22	CHILD ID 1	NAME: VIDYA	ENTERED SCHOOL	NA	NA	NA	NA
13275	22	CHILD MOVED AWAY	13.0345	80.21244	NA	NA	NA	NA
13278	22	CHILD MOVED	13.0345	80.21244	NA	NA	NA	NA

Fig 6. Monitoring the Attendance of child entry and exit.

The system (Fig.6) comprises of a face recognition system for reporting the attendance of the child after entering the school zone. If the child has moved out of the school zone or the connection between the child and the school zone is interrupted, then a message is sent to both the parents and the school along with the current location of the child using GPS tracker that is fit inside the module



13190	22	HEALTH ABNORMAL	0	177	27	NA	NA	NA	NA
13191	22	HEALTH ABNORMAL	0	178	27	NA	NA	NA	NA
13192	22	CHILD ID 1	NAME: YAAZHINI	ENTERED SCHOOL	NA	NA	NA	NA	NA
13193	22	CHILD ID 1	NAME: YAAZHINI	ENTERED SCHOOL	NA	NA	NA	NA	NA

Fig 7. Health Abnormalities are reported

The above system Fig 7.shows measuring of pulse per minute. Based on Beer Lamberts Law, the heart beat sensor detects the flow of blood corpuscles and blinks.The Respiration Sensor is used to monitor abdominal or thoracic breathing, in biofeedback applications such as stress management and relaxation training.The above signals are sent as messages to parents and school only during abnormal conditions



Fig 8:Device control using IOT.

Hence using the app developed for the proposed system, we can control the working of the sensors and devices used in the module. So, we can reduce the cost for batteries and power supplies for the whole module.

IV.CONCLUSION

The main idea of thispaper is to provide better and efficient health services and security to the school children by implementing a networked information cloud through IoT so that the experts and doctors could make use of this data and provide a fast and an efficient solution. The final model will be well equipped with the more featuresTheIoT model is used on many application areas in order to reduce the problems on the application execution. Like smart watches more advanced wearable models are required to reduce the risks in the human lives by giving hands to the children. The composition of more different purpose sensor may improve the abilities of required system design on the given problem domain. This paper has

covered about the issues of children how it can be overcome by using advanced IoT components available in the hand. But more research has to be continued to reduce the size of the device and fastness of the device in communicationwise.

V. FUTURE WORK

In future, the currently proposed system can be improvised by adding other parameters that is required for children. The system can be developed further by implementing additional health monitoring sensors like, blood pressure, respiration rate, sleep cycles of REM&NREM and EEG analysis. The system accuracy can also be improved by increasing the trustworthiness of the device to avoid any discrepancies, as in medical and healthcare, a minute error may cost a life. In addition we can also add different zones such as bus section, along with wireless camera which ensures the safety. In bus section we also can implement the fire detecting concept.

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