A Survey on Monitoring and Tracking Children's Activity using Android Application

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Abstract- This Parental control application presents a smart phones application which will monitor and track children activity to improve the child safety and that is also useful to help child in installing application. It will improve communication between children and parents. The importance of the parents role is to provide an understanding regarding the content of the smartphones application to kids . So, the kids will think and select applications that are useful to them. Parental management application is developed to control and limit the utilization of applications on smart phones by children.

Keywords- Parental Control, User Interface, User-Centered Design, Location Tracking, Driving Detection.

I. INTRODUCTION

This parental control application study provides guidance about smart phones applications to kids to get understanding of usability of apps and to form a better understanding between parents and them. The kids can suppose and judge on one thing that they face. The other benefits are to make them do the well communicated with another person. kids have started hanging out with their friends and start to act like the outside world. But now many kids are a lot of typically addicted to gadgets instead of playing out and socialize with their friends. The negative content will embody components of violence, pornography, crime, and so on. These components will come back from anywhere, such as: video, games, television, and web. Whether it is considered sensible or unhealthy, kids watch plenty of video, and also the quantity of your time they pay viewing continues to increase. We present an approach to content control where parents and children collaboratively configure restrictions and filters, an approach that focuses on education rather than simple rulesetting. We highlighting the importance that parents place on avoiding inappropriate content.

Objective of the study

a) The main objective of the Parental Control application is to maintain and improve the child's safety, and to monitor child's activity by using smartphone application with some restriction to child, by providing them all knowledge of smartphone applications.

b) We are developing an application that will work on smartphones to track and monitor the children.

c) To get the confirmation and to provide the safety during driving by finding location of child whether he driving or not and accordingly child's mobile will be turned on silent mode.

d) Parental Control application also provide history of children's smartphone such as SMS backup, Call log, GPS Location.

II. LITERATURE SURVEY

Yuvraj Rathod [1] presented Designing child tracking system to assure parents for child safety from suspicious actions and happy in school environment. This paper focused on implementing children tracking location system for every child attending school. This proposed tracking devices can be weared as wrist watches, anklets or in I-cards. The child module include ARDUINO, Global positioning system, Global system for mobile communication and receiver include parent mobile phone. It is very useful for women safety. This Mobile terminals have wireless local area network (LAN) and Bluetooth device that adopts Bluetooth communication among mobile terminals in every group to collect information and delivers to respective server using wireless LAN. In existing system autonomous clustering technique was used to manage the groups of android terminals that are attached to the children in school. These android terminals have wireless LAN and Bluetooth device that results in less attention towards the children and also it offers less security. Some children tracking systems also developed on mobile ad hoc networks where each parent may not get group information of child. Existing technologies were not useful to prevent crime against children ,So new technology developed with field experiments and experiences for children tracking system. In this paper Arduino Microcontroller board, GPS[NEO-6M]Module, GSM(SIM800L) are used in the hardware system and Arduino Software (IDE) used in software system. Arduino Microcontroller Board is microcontroller based board which has 14 digital input/output pins. It needs low power as 5v for operating for this application. This embedded microcontroller initiates with AT commands and sends child information message to mobile phone through GSM module. In GPS [NEO-6M] Module the Global Positioning System (GPS) is a satellite-based navigation system which is made of at least 24 satellites. GPS works in any weather condition, anywhere in the world, 24 hours a day and for free of charge. It transmits a unique signal and orbital parameters which allows GPS devices to decode and compute the location of the satellite. GSM(SIM800L) transmits SMS, voice and data information with low power consumption and fit into small space. Bluetooth and embedded AT allows cost savings fast in time .Panic Button is developed to use when the child is in dange. By pressing the panic button message get forwarded to parents mobile and detect the location of child. The open-source Arduino Software (IDE) provides the platform to write the

code and upload on the board. It runs on Windows, Mac, iOS and Linux. The environment is written in Java and based on the processing and open-source software. This application automatically updates location without user interaction and uses SMS when Internet Connectivity is not available. The system requires Location and telephony services. It can be used at indoors where GPS satellites connectivity is not available. The application was designed to locate missing child which gives detail information of about child tracking system by using GSM and GPS. Emergency alerts can be added to improve the system.

SyafrizalWardhana[2]proposed an smart phone application for improving the communication between children and parent. The user interface is the plays most important role in parental control application design. User Centered design (UCD) method was used that focus on the needs of parents and children's and UCD provides the parent and children data directly so search process results are more accurate. UCD has 4 phases specify context of use, specify requirements, produce design solutions, and evaluate design. In UCD first phase includes some interviews and observation to check the needs and problems of parents and children.

The observations summary as follows:

Parents have a positive feelings if children are using smartphones associated with creativity and intellect of children such as puzzles, games, quiz, drawing etc.

They scared if child saw pornographic contents that should not be viewed by children.

Some methods such as to choose the applications that can be used, supervise the children when using smartphones, limiting the use of smartphones use to child.

The main problem is parents do not always supervise children when using smartphones, Parents do not know the application information that child is using frequently.

Parents rarely have enough time to discuss the content of applications that children are using. From that information it specify the requirements in the second phase such as category and age group for the application, parents requires dark font colours to more readable and wants to select content of application and set duration of smartphone usage. Children requirements are select and play apps. The next phases are produce design solution and evaluate design .The evaluation of design used Quality in Use Integrated Environment (QUIM) for testing.

The testing result affects learnability and accessibility as their percentage value was 90% .The design was evaluated again with some improvements in previous design and then the results of learnability and accessibility was improved from 90% to 94%.From the analysis and implementation the user interface presented in this paper provides solutions to the needs of parent to educate the children in selecting and using smartphone application.

Weiyang Zhang [3] presented dual camera children monitoring system on motion tracking technology which is image /video based monitoring and alarming system for children safety purpose. The system monitor and track children state and from children's movements analyses the danger levels and make proper reactions to the danger such as triggering alarm and avoid dangers by doing something. The OpenCV library was used for processing images and videos and get the information of children's motion, location and situation.

The system has three main parts, i.e. the monitoring module, anomaly judgement module and alarming module. The monitoring system monitor the behavior and situations of children and send parents an alarming message as per needed. The anomaly judgement module describes the children's behavior. This module based on the production principle which was simplified in following term:

IF P, Then Q

Where P presented the precondition rules namely Left Hand side(LHS) , and Q is the conclusion that derived from the corresponding conditions namely Right Hand Side(RHS).for example an infant is playing on the bed. The danger of dropping from bed can be described if the infant is very close to the margin of bed then it is possible that the infant will drop. The alarming module send alarm messages to the parents and guardians of children's who are monitoring. Sending message is convenient and effective way to warn the parents if their children are in danger. The alarm message in this system can be sent on cellphone when the alarm is triggered in the form of text message. The system included host PC, two cameras an ethernet router and a bread board and number of factors such as motion tendency, coordinate, velocity, body parts etc. can be taken into considerations. According to the image and video results the conclusion is that this system judge the situation and send messages when children in danger and protect the children.

However there is a limitation in monitoring model accuracy so these system can trigger alarm only for simple danger situations of children. It is low cost auxiliary system but more work needed in image processing methods to identify different body parts and distinguish behavior of children. In consideration of the overall system performance and cost, the system gives invaluable benefits in monitoring the safety of the children.

S.Ravikumar [4] presented an application which is android based that helps parents to track their children's activity. It was implemented to get the location which is based on real time map only when the user is found to be missing or kidnapped. Parents can text message from parent tool to children side to get the location of child .In response to this children tool accept that SMS and reply as a GPS location to the parent tool. This application also monitor the child's activity by monitoring call logs, SMS, MMS sent and received, GPS location with the help of IMEI number. This application is based on Douglas Peucker Algorithm and normally it is known as RSTS real time GPS tracking simplification. This algorithm has several simplification routines such as:

Changes in direction

Perpendicular distance

Distance threshold

An algorithm for adaptive filtering of GPS spot is proposed to check the algorithms sensitivity to GPS data. The first step in the figure describes the installing application on the both android phone and in the second step to set the User id and password to start tracking. By using User id and password the information gathering from adolescent mobile such as grabbing data like call logs, call durations, SMS sent and received by the adolescent. In the fourth step the GPS location can be achieved and in the fifth step explores the sequence of receiving alert on the parent's tool based on the adolescent activity.

The algorithm is 90 percent faster and they improve the best and better simplification of the users distance but it was costly and there may be possibility that information can be customized.

VidhyasaharanSethu [5] presented this paper on speech- based emotion detection utilizing only acoustic data, i.e. without using any linguistic or semantic information. The use of speaker-specific feature warping as a means of normalizing acoustic features to overcome the problem of speaker dependency. In this paper the performance of the system was compared that uses feature warping to one that does not. The back-end employs an HMM-based classifier that captures the temporal variations of the feature vectors by modelling them as transitions between different states. Classification accuracy increased up to 20% after Evaluations conducted on the LDC Emotional Prosody speech .

However, in this approach it proves that acoustic data is speaker dependent, and can result in inefficient estimation of the statistics modelled by classifiers such as hidden Markov models (HMMs) and Gaussian mixture models (GMMs).

ArbabWaheed Ahmad [6] presented in this paper that Home security and control is one of the most basic needs of mankind from early days. But today it has to be updated with the significantly changing technology to ensure vast coverage, remote control, reliability, and real time operation. Developing wireless technologies for security and control in home automation systems offers attractive benefits along with user friendly interface. In this paper presented the implementation of a novel security and control system for home automation. The proposed system consisting of a control console interfaced with different sensors using ZigBee. Suspected activities are conveyed to remote user through SMS (Short Message Service) or Call using GSM (Global System for Mobile communication) technology. The remote user can control his properties again through GSM-ZigBee combination. Besides, a traditional burglar alarm enhances security in case of no acknowledgment from remote user.

This system is a user friendly way of a reliable portable monitoring, low cost, low power consumption and control of the secured environment. serial communication and mobile phone AT-commands(Attention Telephone Terminal commands) concepts used in this paper , the software is programmed using C-Language. The hardware using ZigBee EM357module, Atmega128 MCU (microcontroller unit) the design has been implemented.For global communication GSM module is used to communicate between user and system.

Traditional burglar alarm mode is also used to ensure reliability.

Hao-Hua La [7]explained in this paper as aging population is growing, and the young people are more concerned about the real-time condition of the elderly. This paper aim to propose a real-time monitoring system, obtaining and analysing the outdoors dynamic information of the elderly, which is composed of three cooperative modules (mobile client, server and sensor). The sensor is equipped with a Bluetooth module to the data transmission, and the server is mainly responsible for distinguishing between the falling attitude and normal activity and record the outdoors motion path of the elderly. The result is displayed on the client, including the mobile phone and browser. If the abnormal condition emerges, the phone of the elderly immediately alarms and the server sends message to ask their children and relevant departments for help at once. The system shows a good real-time performance and an accurate result. When the experimenter was normally lying and sitting down, the phone did not alarm. While the falling down happened, the phone of the experimenter immediately sounded alarm signal and indicated abnormal condition and gave feedbacks to another phone.

The experiment shows that the sensor data could be received by mobile phone client and server, and it is practically achieved for the desired function. It proved that this platform is a reliable, usable system with accuracy and real time features.

David J. Wheatley [8]Video consumption is increasing from the TV to other, portable wireless platforms and from linear to on-demand viewing. To define the end user requirements a series of user experience studies carried out for a targeted (1-10 yrs.) children's tablet video application. Other studies were also carried out to define parents' needs for parental control functionality. The process consisted of three phases. Phase 1 consisted of an online survey of parents to understand children's current viewing patterns and behaviours. This secondary research and previous data , was then used to develop some initial design concepts for the application, and some key design and interaction elements were evaluated with children using in phase 2 paper & card mock-ups. In second phase ,Children also evaluated an early application prototype. This Results suggests that three different levels of interface complexity would likely be necessary for the target age range. The third phase consisted of field trials of 3 prototype interfaces carried out with 25 children in 11 families.

A primary objective of the field trials was to evaluate any impact on individual and family viewing patterns and behaviours . Hence, this proves that interface preferences broadly aligned with the expected age targets, and other major benefits of the application included the strong feelings of ownership, control and independence in children which reduces the need for parental monitoring and direct involvement in content selection and device control. This paper focuses on the iterative design process and the effect of the application on content selection and control. There was considerable research and iterative development of the user interface with children, and this proved to be very easy to use,

with only a small no of design improvements indicated.

Yasmeen Hashish[9] In this paper parents and children collaboratively configure restrictions and filters in this approach that focuses on education rather than simple rule setting. An initial exploratory qualitative study conducted with results highlighting the importance that parents place on avoiding inappropriate content. He designed an initial prototype which allows parents and children to work together to select appropriate applications, providing an opportunity for parents to educate their children on what is appropriate. A second qualitative study with parents and children in the six to eight year-old age group gives a favorable response to this approach. This results proves that parents felt that this approach helped facilitate discussions with their children and made the education more enjoyable and approachable, and that children may have also learned from the interaction. This search provided some parents with insights into their children's interests and understanding of their notions of appropriate and inappropriate content.

Jong-Tak Kim[10] presented Emergency situation alarm system Monitoring system for people like elderly live alone performs very important function in the event of an emergency. In this paper, author proposed an implementation of real-time an emergency alarm system, which is based on the motion tracking. In this paper, the proposed system is consisted of a real-time motion tracking based on vision using camera. By analyzing the human motion tracking using sequential frames acquired by a camera an emergency situation can be recognized. This system transmits the status of the person to guardians, social workers, family and acquaintances When an emergency situation is detected using the home health gateway using mobile transmit system. The information that is is real-time camera images transmitted to the mobile system taken 10 seconds from the recognized point of an emergency situation.

The information from this paper contains message which was analyzed by motion tracking technology. In this paper, a typical low-cost webcam and a small mini-computer used in order to expect the efficient popularization of the system. Author also used the gateway based on wired/wireless communications. If an emergency situation to people like elderly live alone is occur, we expect to be able to obtain the help of the people around themselves using this system. Author proposed a real-time emergency situation alarm system that can alert emergency situation by transmit message including images quickly to the people around them if an emergency situation occurs to people like elderly live alone. This system has used motion tracking techniques based on captured images from a web cam. This system results has the advantage of being able to detect emergency situations realistically and intuitively.

Fatemeh Shahrabi Farahani [11]explained that Emotions play a critical role in people interaction. To understand the human emotions by computer is desirable in several applications, especially by observing facial expressions. A new fuzzy-based method presented in this paper for emotion recognition from eyes and mouth features in different ages. The eyes and mouth

combination of different color spaces detected in this method. The four parameters consist of eye opening, mouth opening, eye opening/width ratio and mouth width are selected for fuzzy analysis. Implementing Mamdani-type implication relations, facial attributes and their mapping to emotion space are encoded. By applying the method on Ebner's facial expression database indicates 78.8% accuracy.

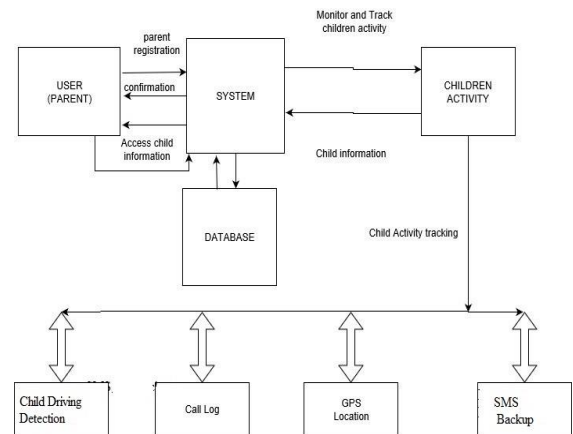## III.   SYSTEM ARCHITECTURE

Fig.1: System Architecture diagram

This architecture presents the parental control application block diagram .In this diagram Parents ,Child and System are the main components. The communication between parent and children is done through the system and all data will be stored in database. This application requires large amount of data storage because it accesses all child's data and store to database. The main modules of this applications are SMS backup, Call log, GPS location Tracing and Driving Detection of child. It Monitor and track children activity. The main purpose of this application is Child Safety.

In existing system the systems [3]are developed to monitoring and tracking children's activity by using motion tracking technology which gives improved performance on image and video monitoring . it is low cost system but , However there is a limitation in monitoring model accuracy so these system can trigger alarm only for simple danger situations of children. In fuzzy approach[11] it uses eyes and mouth combination to detect the facial expressions but its result accuracy is 78%. In speech based emotion detection[5] the system uses only acoustic data for emotion detection .This type of data is speaker dependent so sometimes it gives insufficient estimation of results. In Children Tracking System based On Android Mobile Terminals[1] , The Mobile terminals have wireless local area network (LAN) and Bluetooth device .It adopts Bluetooth communication among mobile terminals in each and every group to collect information and delivers to respective server using wireless LAN. Bluetooth device that results in less attention towards the children and also it offers less security does not provide the accurate GPS Location and driving detection , So new technology developed with field experiments and experiences for children tracking system.

So the proposed system will be designed to overcome the

limitations of the previous system to get the child's SMS backup, Call Log, All Images from gallery ,current GPS Location and Driving Status . In this system the application will be designed to get the accurate GPS Location And to turn the child mobile on silent mode automatically when it is observed that child is driving by using Haversine algorithm.

In this parental control application parent and child communication takes place through user interface.

IV. ANALYSIS AND DISCUSSION

This following graph shows the resulting accuracy of previous work in parental controlling 78.8% to 90%. By using motion tracking technology [2] accuracy is 78.8% and in the paper that used douglas-peucker algorithm[3]   and user-centered design[4] method result accuracy obtained is 90%. This accuracy can be increased by using parental control application as compare to previous work.
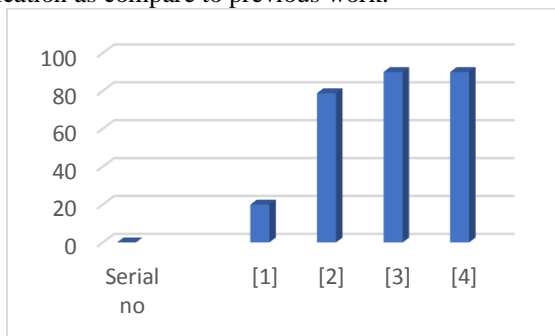

Fig.2: Comparison of different algorithm

Serial No	Methodology Used	Result %
1	HMM's and GMM[7]	20%
2	Motion Tracking Technology[5]	78.8%
3	Douglas-Peucker Algorithm[3]	90%
4	User-Centered Design Method[1]	90%

Table: Accuracy

V.   CONCLUSION

This smartphone application is used to provide the way for parental control solutions by using user interface that educate the children regarding the use of the application and reduce the misuse of smartphones . In this smartphone application parent and children can do a discussion about content and the user interface is built according to user needs for parental control. This android based application gives clarification to assist parents to track the children activity .By using this application user can get SMS backup, Call log, GPS Location ,turning child's smartphone on silent mode when detects child is driving. In future more work can be done on list of installed apps and sharing inappropriate messages and videos online such as some abuse words can be used while typing text messages by children.

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