Smart and Secure IoT Based Child Monitoring System

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ABSTRACT

IOT is the vast area which is getting upgraded in the field of security as well as in the field of industry. In the field of security the IOT also plays an important role for the child's safety. To overcome the problems of guardians we have used the radar sensors and the obstacle sensors for identifying the child problem and for maintaining his safety. In this proposed system we have worked on child safety where we have detected the danger zone in which the child enters and the signals or alarm buzzers are given to the guardians.

Keywords : Internet of Things (IOT), Deep Learning for Object Detection, Radar Sensors for Height Detection.

I. INTRODUCTION

Nowadays most of the parents face difficulties in managing their children due to their busy schedule. Every time they are not able to watch their child. To overcome their problem we have worked on a small IOT device which will inform to the guardian about the child danger and the device will send the signals to the guardians mobile device or else by alarm .The main motive of this device is to minimize the problem of guardian and also to protect the child form various types of danger. System consist of following points:

1. harmful object detection using deep learning techniques.
2. Height detection by using a Radar sensor to save the baby from falling down from height.
3. sounds an alarm when the baby enters the danger zone.

II. RELATED WORK

a. Survey on existing System

The existing systems monitor the baby and give an update of his health and mind status of the children.

hadoop and C4.5 algorithms for predicting the disorders using the collected data.

Baby cradle system uses the Internet of Things, Amazon Web Service, Baby Cradle and provides parents a smart system to help these parents monitor and comfort the baby.

b. Survey of child monitoring system

[1] Chinlun Lai, Lunjyh Jiang,"An Intelligent Baby Care System Based on IoT and Deep Learning Techniques", in the year 2018,international scholarly & scientific research & innovation.

a. Methodology: This system uses Baby care system, internet of things which works for infant care work. It also uses deep learning techniques.

b. Findings and Application: This device monitors the baby's conditions such as position, body's temperature, and posture through deep learning which helps parents to know the baby's condition.

c. Remark (Future scope and conclusion): The assistance of the proposed baby care system, it can detect the potential dangerous events immediately and thus prevent the baby from possible harm or death

[2] M Nandini Priyanka, S Murugan, K N H Srinivas, T D S Sarveswara Rao, E Kusuma Kumari,"Smart IOT Device for Child Safety and Tracking"June 2019, Published By: Blue Eyes Intelligence Engineering

Retrieval Number and Sciences

a. Methodology : This system uses loT, Children Safety using GPS, GPRS Sensors. It also includes a Serial camera and LinkIt ONE board.

Findings and Application: This system is developed for the guardian to locate the exact location of their child and gives child health information through message.

c. Remark (Future scope and conclusion): This research demonstrates Smart IoT devices for child safety and tracking helping parents to locate and monitor their children. The main scope for this is to ensure the device which gives total safety of the child.

[3] Aslam Forhad Symon, Nazia Hassan, Humayun Rashid, Iftekhar Uddin Ahmed, 1S M Taslim Reza. "Design and Development of a Smart Baby Monitoring System based on Raspberry Pi and Pi Camera"sept 2017, IEEE:

a. Methodology: The Raspberry Pi B+ module is used to control the system of the hardware. MIC is used to detect baby's crying, PIR motion sensor is incorporated to detect baby's movement.

b. Findings and Application: This system helps the busy parents to detect the child motion and sound simultaneously it also display the position of child on the display monitor

c. Remark (Future scope and conclusion): An automatic baby monitoring system is the best solution for parents to observe their babies in this busy era.

[4] Deepak C. Mehetre, Madhuri P. Joshi "IoT Based Smart Cradle System with an Android App for Baby Monitoring." 2017 Third International Conference on Computing, Communication, Control And Automation (ICCUBEA).

a. Methodology: Automatic swinging of a cradle starts on the detection of baby cry sound. Sounds an alarm and sends an alert on the smartphone when the baby does not stop crying after a specific time.Sounds an alarm and sends an alert if the mattress is wet.

b. Findings and Application: Though mother's lap is best for baby, considering the need of present world and knowing the significance of baby care, this system is designed.

c. Remark (Future scope and conclusion: This system is economical and easy to operate which helps working parents to manage their work. Video monitoring is made available through most commonly used android smartphones.

[5] Binu P K, Akhil V, Vinay Mohan"Smart and Secure IoT based Child Behaviour and Health Monitoring System using Hadoop", 16 Sept. 2017,IEEE paper.

a. Methodology: This system uses hadoop and C4.5 algorithm for predicting the disorders using the collected data.

b. Findings and Application: It monitors the baby and gives update of his health and mind status of the children.

c. Remark (Future scope and conclusion: Including more health based sensors in the system will help in the health monitoring and guided with medicinal care in case of any abnormality.

III. SYSTEM OVERVIEW

3.1 System Architecture

This architecture shows the working flow of the system. When the baby is on height then the radar sensor takes the distance between the baby and the object .Then decision making will take place. When the depth is below the height 50 , then low alert is given to the caretaker and when the height is greater than 50 then high alert is provided to the caretaker for

the alert purpose of the display device like mobile ,tablet etc.
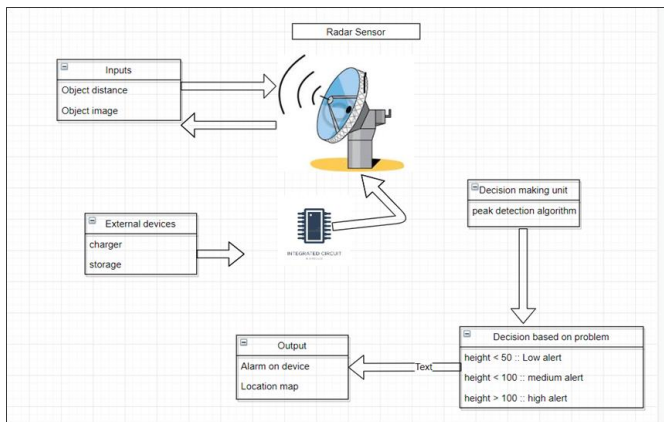
Fig-1 system architecture

For harmful object detection is a method which uses feature extraction from a video frame to retake dangerous objects for example objects like scissors ,knife ,gun etc . the proposed system uses deep learning method to detect harmful object.we have previously used versatile model which captures frames at 45fps.It filter every frame from BGR to HSV. deep learning gives the best fit for object detection.
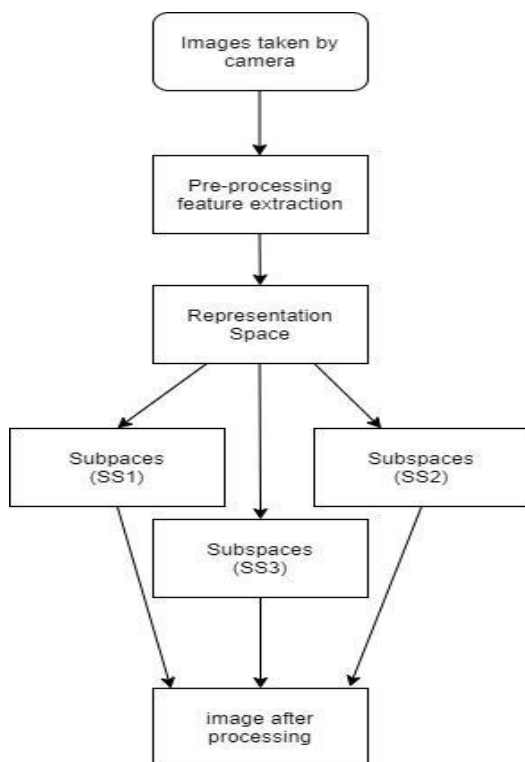
Flow chart 1 :- Image processing
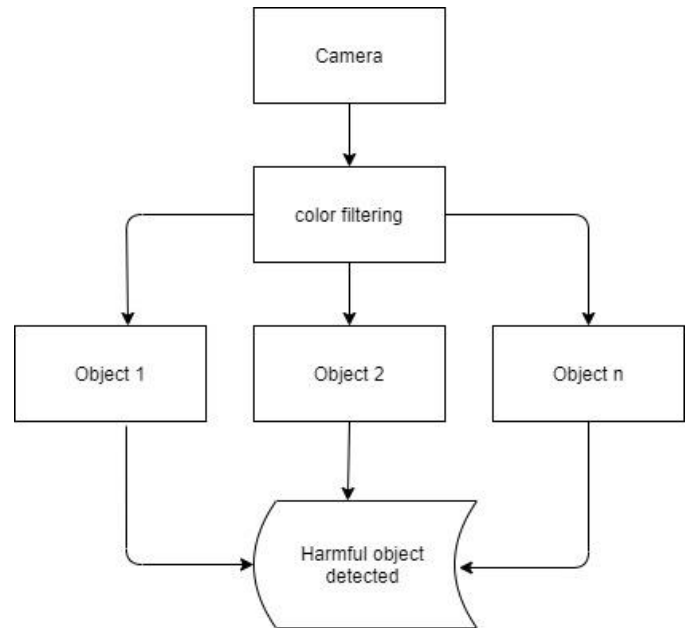
Fig-2 : flow diagram of object detection

Image taken by the camera will process the image and will convert BGR to HSV and then it will detect harmful objects and send an alert to the caretaker/ guardian of the baby.

2.2.1 SYSTEM OVERVIEW:

1. algorithm for object detection

Step 1: take video as input(45fps)

Step 2: Convert image BGR to HSV

Step 3:then feature extraction from the image takes place.

step 4:convert image into 2D matrix and pass it to the trained model.

Step 5:if input Image is matched to the freeze model then display the object names.

Step 5.1: if image is equal to harmful object.

Step 5.2: then send an alert as a harmful object detected.

END

Step 6: Repeat Step 1 to 5 for test image.

step 7:stop

2.Algorithm for height detection:

Step 1: measure the depth from baby by using radar sensor

Step 2: calculate maximum depth

Step 3: if distance >50 && distance<75

step 3.1:send low alert to caretakers device .

step 3.2:if baby is safe then

goto step 1.

end for loop

Step 4: if distance>75

step 4.1:send a high alert to the caretakers device.

step 4.2:if baby is safe then

step 4.3:goto step 1.

step 5: stop

IV. FUTURE SCOPE AND CONCLUSIONS

For implementing the IOT devices which ensures the solution for baby safety problems. A new idea to implement an automatic system for baby monitoring to remove the anxiety completely of the parents. This project proposes Smart IOT Devices for child safety and tracking helps the guardian/parents to locate and monitor the baby. If any abnormal values are read by the sensors then an SMS is sent to the guardian/parents mobile.
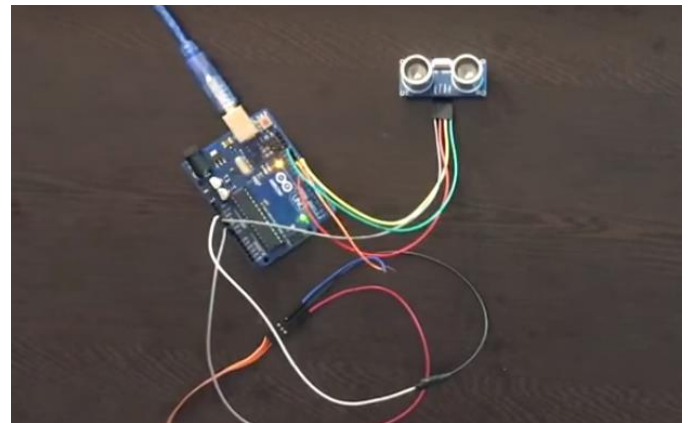
V. RESULTS
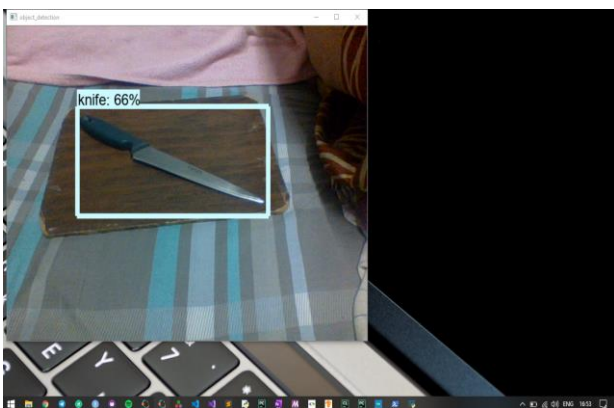
Fig-3 : Harmful object detection (knife)
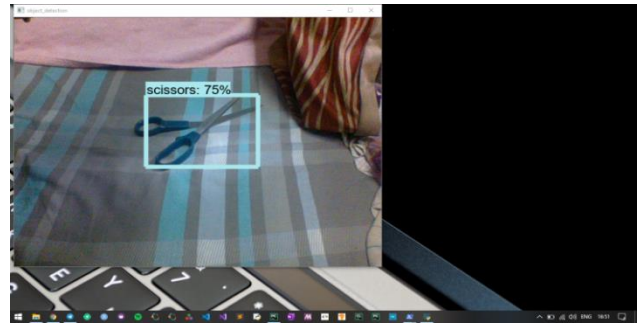
Fig-4 : Harmful object detection (Scissors)

Fig-5 : Hardware unit

VI. ACKNOWLEDGEMENT

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