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Elink - A Safe Secured Device

Priya.L[1], A.Sathya[2], Kumar.P[3]
[1,2,3]Rajalakshmi Engineering College, Chennai, India
[1]priya.l@rajalakshmi.edu.in,[2]sathya.a@rajalakshmi.edu.in[3]
kumar@rajalakshmi.edu.in,,

Abstract: This paper focuses on building a safe secured system which alerts the owner in case of any theft. The security system uses Haar Cascade Classifier to detect the movement of the object and captures an image with the help of a camera. Once the object is detected the alarm is activated and message is sent to the user with the help of GSM module. The captured image is then transmitted to the user's mobile application with the help of IoT gecko online platform. The image is verified and an alert message is sent to the police control room by the user.so that it benefits public patients and the progression of traffic.

KEYWORDS: Alarm, camera, GSM module, Haar cascade classifier, Raspberry pi.

I INTRODUCTION

Today security and safety is just a click of the appropriate technology away and with such advancements happening, the security of one's home must also not be left behind. Modern advances in electronics and communications technologies have led to the miniaturization and improvement of the performance of computers, sensors and networking. These changes have given rise to the development of several home automation technologies and systems. Automated home is the combination of home security and surveillance system.

Surveillance can be defined as monitoring of the behavior, other changing information, activities, observing or analyzing particular area for the purpose of influencing, directing, managing or protecting. A home security system should provide security and safety features for a home by alarming the residents from natural, accidental and/or human dangers such as: fire, flooding, theft, animals invading, etc. The Internet of Things plays a major role in the security and surveillance systems. The objectives of IoT are: To build highly interconnected system where devices will be the users of the internet; To work 'smartly' for the betterment of human beings; To improve the relationship between the humans and the environment in which they live. The home automation is carried out without any flaws with the help of internet of things.

II LITERATURE SURVEY

In 2017, K. Prathyusha et.al.., [1] has published the paper **Raspberry PI Based Advanced Security System Using IoT**. In this paper the manual observation of objects and alert is done. The system is to notify the user whenever there is human interference in the surveillance area. Using PIR sensor, this system captures surrounding and detects human presence. This presence of motion notifies the user. This notification process is done by sending short message service (SMS) through GSM Module.

In 2017, Mayuri Dahake et.al.., [2] has published the paper **Implementation of Raspberry Pi for Human Face Detection & Recognition**. The system is programmed using Python programming language. Both real time face detection and face detection from specific images, i.e. Object Recognition, is carried out and the proposed system is tested across various standard face databases, with and without noise and blurring effects. Efficiency of the system is analyzed by calculating the Face detection rate for each of the database. The results reveal that the proposed system can be used for face detection even from poor quality images and shows excellent performance efficiency.

In 2017, Onkar R. Kirpan et.al.., [3] has published the paper **Object Detection on Raspberry Pi**. The goal is to construct a model that can recognize the protest of indicated shading that make utilization of open source equipment and that chips away at the premise of visual information caught from an ordinary webcam which has a reasonable lucidity. Having a picture preparing calculation which distinguishes a protest first and after that tracks it the length of it is in the observable pathway of the camera. As the protest moves, the PC/portable PC/implanted Board offers flag to engine to turn the camera which is mounted on a stepper engine. The calculation on Raspberry Pi board utilizing OpenCV on Linux foundation.

In 2017, P. Pallavi et.al.., [4] has published the paper **Image processing target tracking robot using Raspberry pi**. The

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paper has preferred image processing for object detection using a robot. Image processing is used to capture and calculate the dimensions of frame or moving object image which is captured by Pi camera.

In 2017, Suresh Ballala et al.., [5] has published the paper **IoT based voice and sms update notification system using Raspberry Pi**. The paper is proposed to notify the user by a simple sms and a voice message as the micro controller cannot run multiple programs at a time. Previously the sms was not used but the author has used to make the project simple and easy. By using the GSM module the message can be sent to the user.

In 2017, Neha Barve et.al.., [6] has published the paper **Theft Prevention System using Raspberry Pi & PIR Sensor**. The system is entirely controlled by Raspberry Pi. The PIR has the duty of motion sensing. After motion sensing relays are triggered by Raspberry Pi. Relays are responsible for turning lights ON/OFF. Buzzer will ring simultaneously. System provides a facility of notification to the user through GSM. The theft prevention system uses PIR sensor, relay, camera, buzzer, GSM sim 900A.

In 2016, Priya B. Patel et.al.., [7] has published the paper **Smart Motion Detection System using Raspberry Pi**. The system is suitable for small personal area surveillance. I.e. personal office cabin, bank locker room, parking entrance. Whenever the motion is detected through PIR sensor inside the room the image is captured through camera and temporarily stored in the raspberry pi module. Internet of things based application can be used remotely to view the activity and get notifications when motion is detected. System works standalone without the PC once programmed. One android Application is used to get the notification on motion detection.

In 2016, S. Nazeem Basha et.al.., [8] has published the paper **An Intelligent Door System using Raspberry Pi and Amazon Web Services IoT**. The system uses ADXL 345 accelerometer sensor to sense any change in the motion of the door and raspberry pi to communicate to the AWS IoT console. When there is an intrusion at the door, IoT console invokes SNS module to send notification to the owner. Intrusion data is logged simultaneously into the service account google drive in form of spread sheet.

In 2016, G.karthik Reddy et.al.., [9] has published the paper **Location Reporting System Using GSM – SMS Services**. The system is used to keep track of the objects which are either stationary or in motion and can tracked when there is a free line of sight communication. The tracking of the vehicle is secured with the help of the GSM-SIM number which is private and secure. The System uses a preprogrammed data base of various locations throughout the country containing Location Area Code, Cell ID, Mobile Country Code and Mobile Nation Code, which have a prefixed values and unique for every location.

In 2016, Rahul Pahune et.al.., [10] has published the paper **Face detection system for security purpose using Raspberry Pi**. The system proposed to solve serious problem with high image processing speed. It uses two aspects as face descriptor tool for face recognition and feature extraction for compact representation of image in computer vision. The database is created on Raspberry Pi using matlab. Input image matches with database and the output is displayed on screen.

In 2015, Rahane Madhuri et.al.., [11] has published the paper **Study of Theft Detection and Tracking using Raspberry pi and PIR Sensor**. The system uses mobile technology to provide essential security to our equipment's and detecting the theft. The proposed theft detection integrates camera and PIR sensor, GPS tracker on equipment to give the solution through mobile application. Raspberry Pi operates and controls PIR sensor, camera when motion is detected for remote sensing and surveillance, then capture the image and live video then stores it for future playback, and finally tracing the location of intruder.

In 2015, C. Sureindar et.al.., [12] has published the paper **Motion Detection Using Optical Flow on Raspberry PI**. The system uses Lucas Kanade algorithm to find the displaced object from an image. The project works by comparing the two successive images. Lucas and Kanade's method involves solving for the optical flow vector by assuming that the vector will be similar to a small neighborhood surrounding the pixel. The Lucas-Kanade optical flow algorithm offers a simple technique which can provide an estimate of the movement of interesting features in successive image frames of a scene.

In 2014, Vijayalaxmi et.al.., [13] has published the paper **Object detection and tracking using image processing**. The paper is focused on object detection and tracking of objects. The object is detected and tracked by moving the camera in the direction of the detected object. The author has used servo motor for the rotation of the camera. The servo motor is controlled by the ardunio. The servo motor is rotated in such a way that wherever the object moves, the camera will be pointing to that object. The angle of servo rotations are controlled by the arduino board through its PWM pins i.e., by varying the pulse widths.

In 2014, S. M. Asi et.al.., [14] has published the paper **eye corners detection using Haar Cascade classifiers in controlled environment**. The system uses 300 eye images to train en and ex cascade classifiers regardless of the left and the right eye. These classifiers were then used to detect and locate the inner and outer eye landmarks. It consists of four cameras and two cameras of each side. Respondents were seated at rest position on a chair 90 cm in front of the cameras. They calibrated the system according to the system requirement before taking the subjects three dimensional images.

In 2013, Vandna Singh et.al.., [15] has published the paper **Face detection by Haar Cascade classifier with simple and**

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complex background images using OpenCV implementation. The paper focuses on the face detection in simple and complex background by extracting the features from particular images. To test the performance of haar cascade classifier they have run the experiments on a large number of datasets containing simple and complex images.Two type of images were used in the experiments. The type-1 images contains simple background and lightly affected by the illumination while the type -2 images highly affected by the illumination and have complex backgrounds.

III PROPOSED SYSTEM

Security is a big challenge everywhere because thefts are increasing day by day owing to the unsafe and insecure security systems.A home security system should provide security and safety features by alarming the residents from natural, accidental and/or human dangers such as: fire, flooding, theft, animals invading, etc.Thus Internet of Things conceptualizes the idea of remotely connecting and monitoring real world objects through the Internet.The IoT plays a major role in the security and surveillance systems.The objectives of IoT are: To work smartly for the betterment of human beings; To improve the relationship between the humans and the environment.

The block diagram describes about the hardware connection. The hardware consist of Raspberry Pi board which is connected with alarm, camera, GSM module and PIR sensor. The information from Raspberry Pi is transmitted to the receiver mobile. The PIR sensor senses the radiation and makes the device to start the object detection.

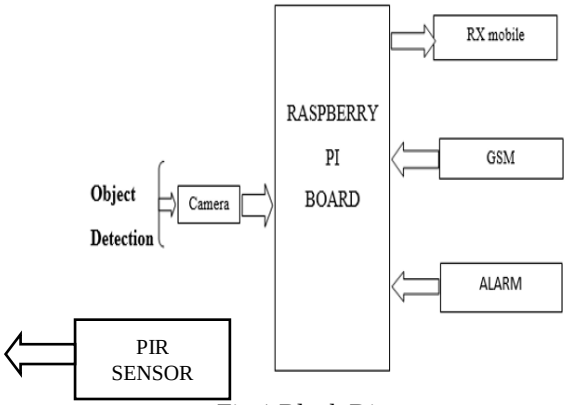

Fig 1 Block Diagram

The proposed system focuses on building a safe secured system which alerts the owner in case of any theft. The proposed system is an IoT based device with is implemented using Haar cascade classifier to detect an intruder at home when nobody is present. The classifier detects the intruder and captures an image with the help of a camera. The image is transmitted to the user's mobile application with the help of gecko online platform. The application allows the user to verify the image and makes the IoT device to buzzer. Then an alert message is given to the police control room for further investigation. Architecture of the proposed framework is shown in Figure 2.

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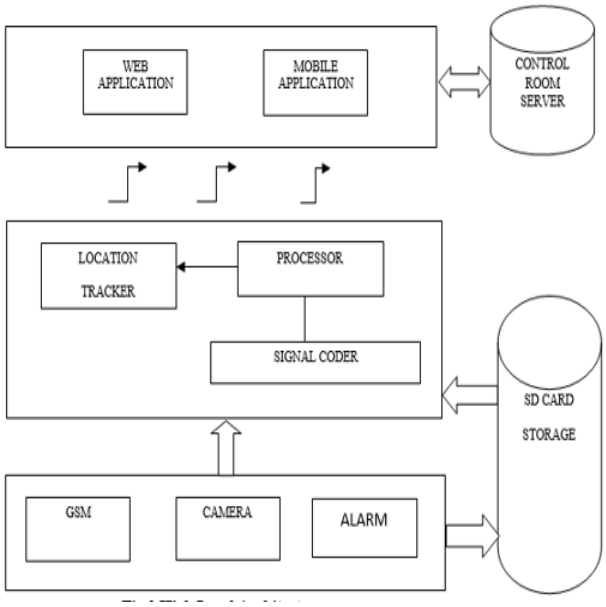

Figure 2 System architecture

System implementation

The user will activates this proposed system when he will not be present at his home for longer duration. After activation of system, PIR sensor is the only component which is active all the time. It senses radiations continuously and sends signal to Raspberry Pi. Signal is in binary format, i.e. 0 and 1 for motion detection it will send binary value 1; else it will keep on sending value 0 to Raspberry Pi. After receiving value 1 from PIR sensor, Raspberry Pi triggers the further functioning. The Haar cascade classifier is used to detect the person and image is captured.

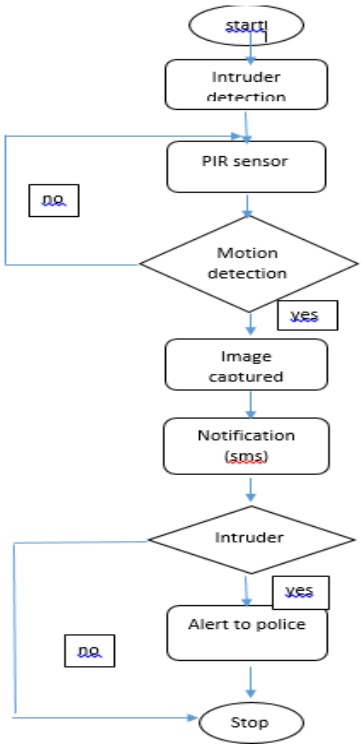

Fig 4: Flowchart

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4. RESULTS AND DISCUSSION

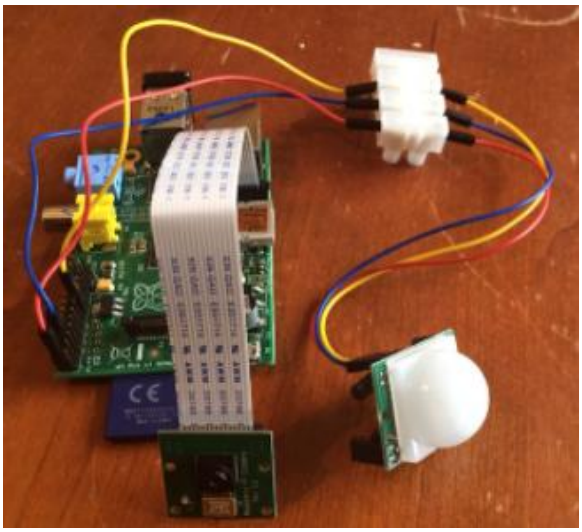

Fig 5 a: Raspberry pi with camera and PIR sensor

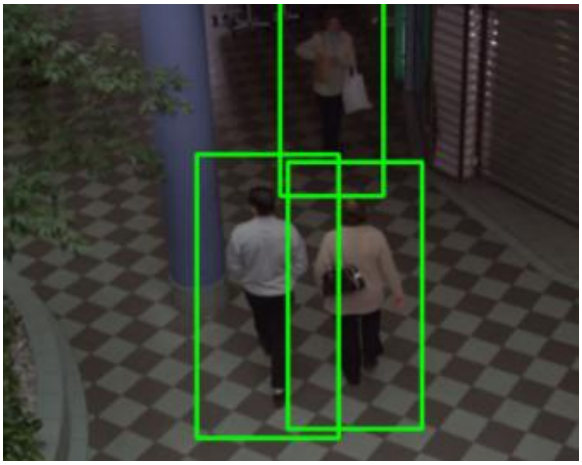

Fig 5 b: OBJECT DETECTION AND IMAGE CAPTURE

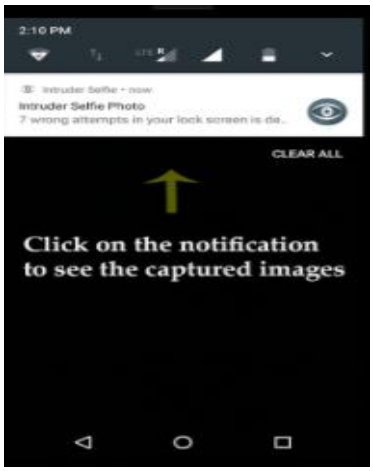

Fig 5 c: notification to the user

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5. CONCLUSION

This proposed system serves as the best solution for theft prevention. It is a complete cost effective solution as n number of PIR sensors can be deployed in the same system. High reliability can be achieved as there exists strong backup. It can also be possible to use the Captured image as strong evidence for criminal investigation. It is also noted that, the system provides high scalability and flexibility. As a future work, new features to existing system such as providing delay timer to the system so that owner can switch off the system and by using framing techniques, video can also be captured as an evidence. To cover large area through the system we can deploy multiple sensors using multiplexer.

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