

Unlocking IoT Potential to Provide Security

Saurabh Uparkar¹, Prasad Ogale²

¹Student, Department of Master of Computer Application, Finolex Academy of Management and Technology, Maharashtra, India

²Student, Department of Master of Computer Application, Finolex Academy of Management and Technology, Maharashtra, India

Abstract - Security has become and need for us now a days. Rapid growth in technology made our life more sophisticated, it can also be applied to save our as well as others life and safeguard the properties.

House burglary is one of the major issue we face when we are not at home. Main reason behind it is lack of monitoring systems in our houses. So, we need an effective monitoring system to overcome above said problem. There are many monitoring systems available for this scenario, but in this paper, we propose a new efficient monitoring system with remote resource access and improved data analytics for more accurate results.

Key Words: Internet of Things, Security

1. INTRODUCTION

The proposed system is designed using IoT technology. In our system, we use the surveillance camera as primary sensor of IoT. It may be wired or wireless. The primary function of this module is sensing the accurate data and storing the same. In next module we have internet gateways, data acquisition system which is required for data aggregation, conversion from analog to digital and control. It also ensures access to system and data transport. After that we need analytics and pre-processing part of the system, in which we have proposed improved data analytics techniques for better analysis, some decisions must be taken in the system. Then next is data value and action taken. This is last module in the system. Based on the analysis the decisions are taken and action are done or automation can be implemented. We have used an IoT based application, we need to consider the following challenges for better performance. Hardware compatibility is major concern as all devices should be compatible with each other. The second issue is travel of data, means data should not be lost at any moment. Because delay in transfer will affect the system performance. The areas in which we can lose data are sensor devices and gateways. The challenge is data analytics. The real worth of this system is realized through the effective and most appropriate actions taken from collected data and analysis done at the final stage. The incorrect data captures difficulties must also be addressed. Due to this whole system became incorrect. So, we have to

ensure the data coming from sensor and we are processing it with the right dataset. Finally, a data security issues can be considered for the given setup. Securing the system from many ransomware and other attacks. And, all IOT applications we need to ensure that the data is being processed safe. The data flow in the system will be from sensor to gateway then gateway to Internet, from the internet to end user. Video sensing is the technology of Digital Image Analysis. The proposed systems can range from wireless house security cameras to sophisticated alarm systems. The communication between the cameras and the gateway may be wired or wireless, anyhow maintaining the system with standard Wi-Fi technology can be advisable. All IOT Devices in the setup is in the network. So, each will have its own unique identification address called as Internet Protocol address. Communication with cloud will be done with the help of IOT Protocol. In the proposed system we have four types of communication models such as device to device communication, device to gateway communication, device to cloud communication and backend data sharing model.

2. EXISTING SYSTEM

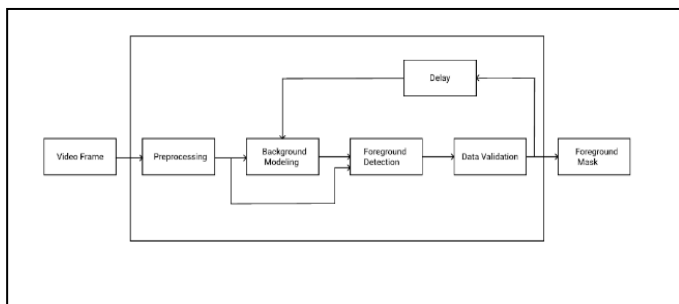
The existing system in surveillance has video capturing device with motion detection algorithm. It detects the motion and sends data to cloud for analysis through gateway. In another approach, when a device detects unauthorized movements, it sends the data to cloud and that image will be sent to user and SMS will be send to the user. In our proposed work we also use high definition video surveillance as a sensor device. The human movement is being identified, then the SMS alert will be sent to user and user will be able to see live streaming from the device with help of an application installed on the user side.

3. WORKING PRINCIPLE

We propose an improved surveillance system with enhanced facilities which provides the most accurate results. The system architecture of the proposed system is given and discussed. From the sensor data is being collected and transferred to cloud. Analytics will be done as part of proposed system. In which the moment of the human being is detected with the help of background segmentation and background subtraction algorithms. If

we detect any motion after this, immediate action will be taken from the actuator side. If user starts the application, he can see the live streaming of his home. And in addition to this, we have added one more feature to it. The surveillance camera contains small speaker, while watching the live streaming itself, he can warn the intruder through the application. We use video surveillance camera for the sensing part. Raspberry Pi as one-board computer for processing. And, we use background subtraction algorithm to detect the intrusion.

Figure -1: Working Principle



4. BACKGROUND SUBTRACTION ALGORITHM

It is a technique to extract the foreground objects from the background in sequence of frames of specific video. It is an extensively used approach for identifying moving objects from static cameras. In this approach, all frames of every two seconds are captured and the last two frames are taken for consideration for processing. Estimation of background for time 't' is done. Then subtraction of estimated background from the input frame is processed. By Applying the threshold value 'td', we could get the absolute difference between the two frames of the video playing. The threshold value 'td' can be less than the difference between two taken frames

$$td < Fx - Fx-1 \quad (1)$$

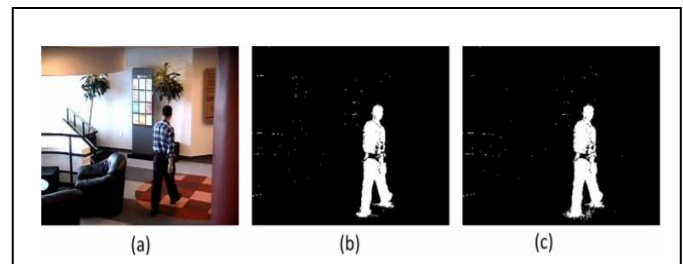
Let us take image at the time 't' is A (x, y, t) and Background at the time 't' is B (x, y, t), As per the background subtraction algorithm the equation will become

$$td < | A (x, y, t) - A (x, y, t-1) \quad (2)$$

The important part in this is finding the threshold. We have used automatic thresholding. Pixel values are modelled as a mixture of adaptive Gaussians. Because, in a pixel multiple surfaces appears and there may a change of lighting. In every iteration, using simple heuristic method, Gaussians are evaluated to determine which is mostly likely to correspond to the background. Other pixels are compared with background Gaussians. Different pixels will be categorized as foreground. And, all foreground pixels are grouped together. Since we are dealing with various threshold for each pixel, it adapting by time. And All

objects are permitted to be a part of background along with the existing background model. Deletion of existing background model is not allowed. One of the major advantages of this technique is fast recovery. And one of the disadvantages of this method is sudden light changes. They will be able to work efficiently without any sudden light changes and drastic light changes.

Figure -2: Algorithm Output



Major four tasks of this algorithm are pre-processing, background modelling, foreground detection and data validation. After the frame gets pre-processed, Background modelling is applied. This process is the major process. Though there are various background modelling are there, we use recursive one. Finally, we could identify the intruder in our home using this technique. Fig (a)describes that the intruder at home. Then fig (b), fig(c) tells that how this background subtraction algorithm works. Our proposed data analysis system, comparing the subsequent frames of the camera at a particular time interval, if it detects any intruder or motion of any object, the background subtraction algorithm employs. It extracts the foreground image from the background image and analysis will be done. After the image is analyzed with the help of foreground and background images, once it is identified that there is something is going wrong, immediate notification will be sent.

REFERENCES

- [1] Comparative study of background subtraction algorithms (Yannick Benezeth, Pierre-Marc Jodoin, Bruno Emile, Hélène Laurent, Christophe Rosenberger), <https://hal.inria.fr/inria-00545478/document>
- [2] Background Subtraction Algorithm with Post Processing in Video Surveillance, <https://www.ijert.org/research/background-subtraction-algorithm-with-post-processing-in-video-surveillance-IJERTV3IS10592.pdf>
- [3] https://www.slideshare.net/ravi5raj_88/background-subtraction
- [4] <https://www.raspberrypi.org/>