

## SMART HOME SECURITY

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**Abstract** - Just as the internet transformed the approach that people work, live, and play, the IoT is pushing that technology towards the next level, beckoning the next gigantic technological revolution. The IOT (Internet Of Things) is delineated as systems, which comprises interconnected devices, digital also mechanical machines, or computing devices including their distinct identifiers as IP addresses and have the potential to transfer data, knowledge across the internet without any assistance of individuals. In the following paper, we have proposed an intelligent surveillance system mounted on Raspberry Pi board with a PI cam which frequently supervises the targeted region considered by the end-user. This system operates on two modes: Surveillance mode and monitoring mode. The surveillance mode generates real-time data as the live stream which can be seen on any device to each end-user while the monitor mode entirely safeguards the intended territory with motion detection moreover alert each user with the subsequent notifications.

**Key Words:** Raspberry pi, Motion Detection, Home Security, Surveillance System, Internet of things.

### 1. INTRODUCTION

Internet of Things (IoT) does provide a modern environment with multiple devices which can be easily obtainable by means of Internet. The Term 'Things' in the abbreviation IoT may represent several objects as an individual person or a complex automobile with features like inbuilt-sensors. These objects have an approved IP address that helps to communicate them with numerous devices and also transfer ample data by the means of connected network without any outer manual guide or error. The Technology established in these devices is formally programmed to give probable decisions by recording the surrounded environment or the inner states. The prior job of the IoT is providing extra ease & efficiency in our day to day life. More number of IoT devices shows more efficient & better connected world. As the use of devices of the IoT is emerging rapidly, the devices connected to it may cross 50 billion till 2020 according to the experts. The present scenario shows about 12 billion devices connected which ensures a great success and IoT demands. The Home

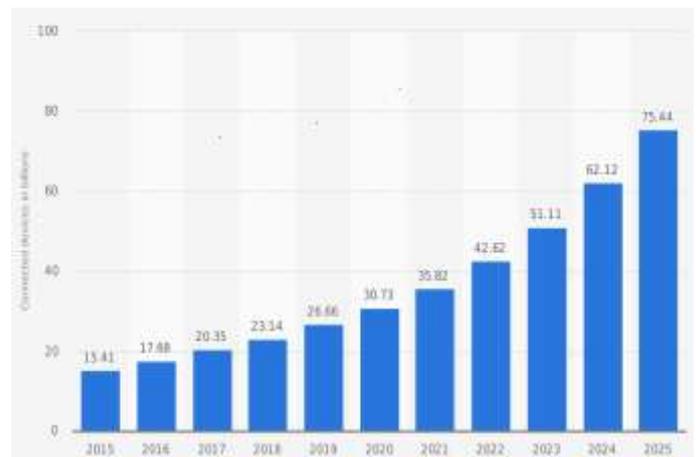


Fig -1: Internet of things connected devices installed from 2015 to 2025 [1].

Automation now a day is among the out growing fields in Internet of Things & leads in the matter of providing security with effective impact. The security provided now with the IoT devices are way beyond from a surveillance monitored alarm system. The recent approach to the surveillance is by live videos to monitor remotely with other hand on features to safeguard the assets, home or people.

In Our paper, we have proposed on of the smart devices used for the security of home. With, the assist of IoT, a smart home security camera based of Raspberry Pi. The devices captures an image on detection of any motion that seems suspicious or when an intruder enters a targeted region. The system alerts the owner via email with the attachment and the text including a warning. IoT makes it more responsive to have a greater eye over the home to make it more safer and secure from the damage or loss by the surveillance in real-time. An owner, besides only getting the captured image of the motion can also stream the live feeds of the targeted region with the real-time surveillance features irrespective of the network whether it's the same home network or local network. Raspberry Pi has become something of a mascot for Internet of Things. The Pi is a uni-board system, which has a memory, microprocessor, wireless radio & ports everything in just one circuit board. The one we are using for the project is the Raspberry Pi (version 3 model B). As Raspberry Pi is small in size, which is a similar to the ratio of normal credit/debit card, it operates like an ordinary computer system at comparatively low cost. Combining few sets of raspberry pi to function as server is highly cost-effective than a regular server

## 2. MOTIVATION

For the accurate functioning of the current system, plenty of maneuvers and resources are necessary. Hence, we propose a system that will work with minimum possible resources with almost no effect on its functioning and the results. Thereby we are providing an economical and systematic working device. Image of suspicious activity is captured and notified to the registered personal whose least required information is saved in the database. Therefore providing the customer with translucent and self-evident service.

## 3. RELATED WORK

Given below are the research papers used for our analysis whilst considering various approaches to providing security.

Neha Patil et al. presented a product where the camera functions as a motion detecting mechanism and the raspberry pi are made to work as a server. The notification and capturing of images will be only done upon detection of any movement. As the camera used is a webcam image quality is not up to the mark. The modules are incompetent to excel in low or no light conditions. Therefore reducing the optimality of the product. Infrared sensors could have been used for low light conditions as they are meant to sense heat irrespective of the lighting situation in the target area. [2]

K.N Karthick Kumar et al. presented a budget security camera system using cameras with passive infrared motion sensors. Python and OpenCV in raspberry pi can be used to ensure that the device is dynamic in functioning, also making the device viable for expansion in the near future. The existing system performs on motion detection, further delivering the message to the user. [3]

Dika Abadianto et al. worked and put forth a face detection and recognition system using MyRIO 1900. MyRIO establishes a connection to a webcam via a USB cable. The webcam takes the picture of the individual and sends it to MyRIO 1900 for further analysis. Face detection is deployed using template matching. According to various test results, the system is able to perform at an accuracy of 80%. The system is incompetent to perform when the distance between the camera and the individual is more than 2.4m. [4]

Shakti Murugan.K.H et al. presented a system that provides a security alert when motion detected. The system is somewhat considered to be intelligent surveillance device as it saves video exclusively when any movement is spotted, hence making the device economical. The alert of the breach in security is not given to the individual as the product is not supported by any mode of network assistance. [5]

## 4. PROPOSED SYSTEM

The figure 2 explains the complete system architecture with each any set-up done while building the system and figure 3 explains the complete raspberry pi model 3 used in the system.

The architecture of the system is considerably complicated however focuses throughout the Raspberry PI-JPEG mechanism Fig. 4 focuses on the major components existing in the system. Blue lines in the figure represent data flows across the architecture whereas red lines represent control which obtains the data from the raspberry pi camera. The following system functions on two modes to provide security as per the end-user requirements: surveillance mode and monitoring mode. Under the regular surveillance mode, Raspi-MJPEG gains a connection from the raspberry camera (PI Cam) to generate consecutive streams of JPEG captured images which preview under the directory following the same name camera\_captured.jpg. These previews are cached within the folder is temporary; therefore the memory of raspberry pi is never strained through the data. These captured jpegs are accessed onto the browser through URL present within the Apache web server. If Raspi-MJPEG process is switched onto monitor mode then the flow of these preview images are preserved, however, an additional image captured is also saved, or a complete video recording is saved which may be in either of the formats the camera supports including High-Definition standard frame rates.

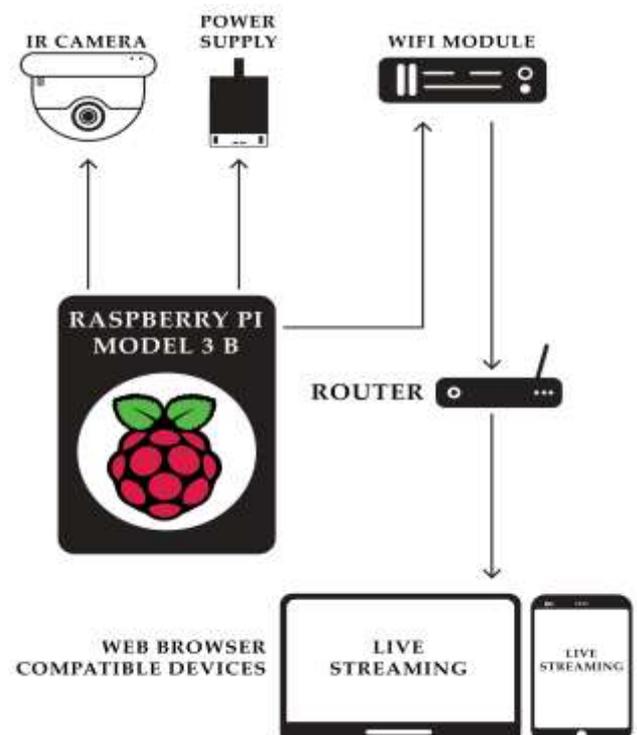


Fig -2: Overview of the System

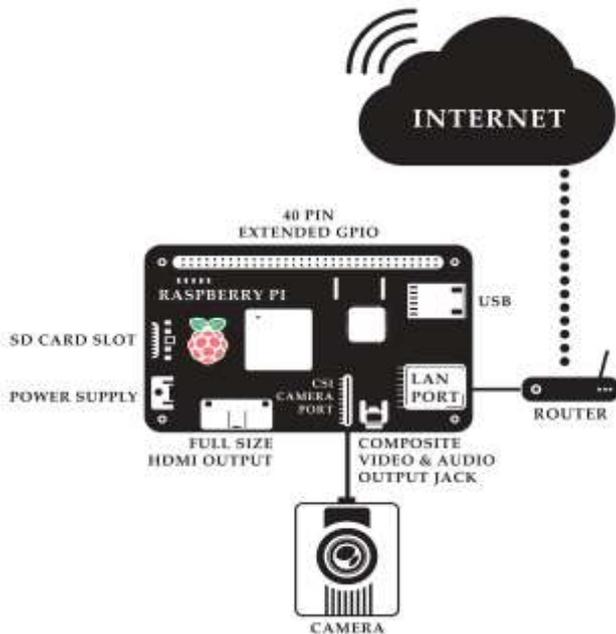


Fig -3: Raspberry Pi 3

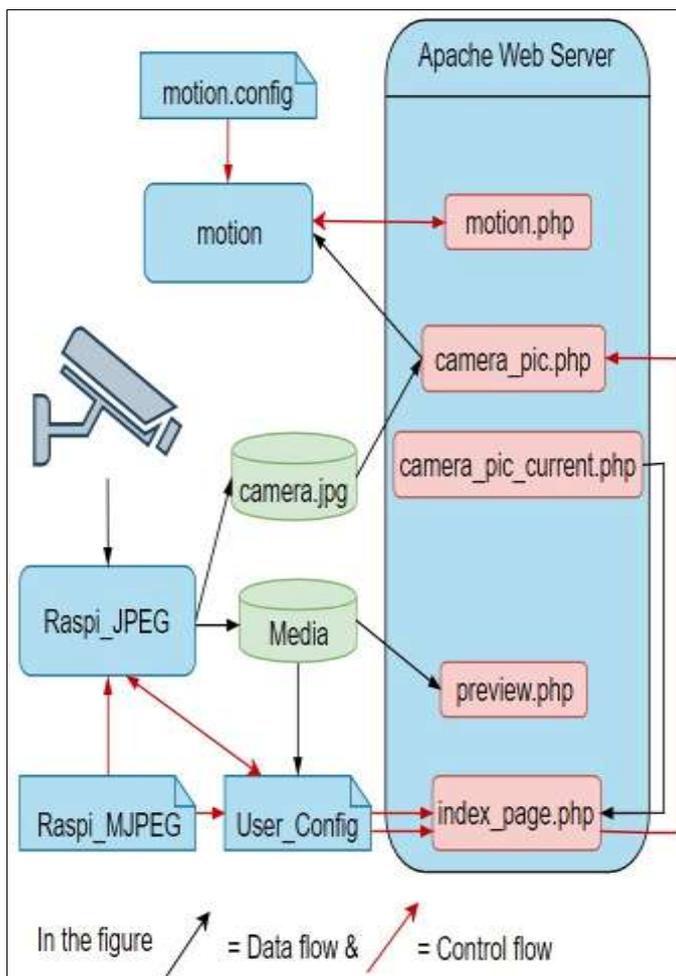


Fig -4: Flow Chart

These data of images or video recordings are stored inside the user-specified media folder. These images are saved directly in jpeg (.jpg) format. Whereas this is not the case with video records, recordings are initially saved as a raw h.264 format from the raspberry camera, however later can be formatted automatically into MP4 (.mp4) when the recording ends.

Finally, Raspi-MJPEG process takes the current camera.jpg from the preview records and saves it in the folder specified by the end-user including a thumbnail name attached on the stored images or recordings. Those thumbnails are utilized by the preview\_image.php process to assign a representation of every captured images or recording when the user wishes to the download. If motion detection is initiated by the user then against detection of any motion or suspicious activity, there will an alert notification given to the user comprising of images captured throughout the situation.

A configuration file is included in Raspi-MJPEG which consists of certain parameters. The config file is read during the initial system boot or on system restart. Additionally, a user-configuration file is also included in the folder which authorizes the user to overrides the existing values of the parameters.

### 5. CONCLUSION & FUTURE SCOPE

The raspberry pi based home security system has been successfully developed and verified. Not only has the raspberry pi been helped for live streaming but also for the camera as a movement recognition component. The capturing and causation notification would be done if there was any detection of movement. The inference of the tests performed on the system confirms that the security mechanism provides optimal observations.

The future possible upgrades could propose to use the unused ports on the raspberry pi to be interfaced with different sensors such as gas sensors, fire sensors, thermostat sensors etc. A better system can be implemented with better performance by utilizing up-to-date hardware in the forthcoming distant future. Moreover, the device could be of great value for security and vigilance department as a suspect can be kept under surveillance for the security, and it can additionally serve to identify culprit during an investigation.

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