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IOT BASED SMART SURVEILLANCE SYSTEM

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Abstract - *In the last few years IOT is rapidly growing across the world, IOT based security system enables the user to view the activity from the remote location and capture the image based on his interest. Android app facilitates the user to receive the notifications when intrusion is detected and view the image from remote area. PIR sensors are used to detect motion. The system works in both Auto and Manual mode, notifications are sent to the user only when Auto mode is enabled in order to avoid frequent interruptions. The controlling power of Raspberry pi from window is established i.e., user can update the position of camera from android phone window and capture the new image.*

***Key Words*: Raspberry Pi, IOT, PIR sensor, Android app**

1. INTRODUCTION

Surveillance is the monitoring of the location, behaviour or activities for the purpose of directing, managing and detecting intrusion by means of electronic equipments. IOT refers to system of interrelated computing devices and it plays a major role in surveillance. Android phone helps user to view the location from the remote area without human intervention.

User is required to install Android app which is developed using Android Studio. Google sends unique device id so that the notifications related to that user is secured, Whenever user gets notifications about intrusion detection he can view the image on android screen and he can also click the left and right arrows on the screen to update the position of the web camera and capture the new image, Hence controlling power of raspberry pi from the window is achieved. Android app works in both background and sleep mode, so that phone's battery is not drained.

1.1 MOTIVATION:

Implementing controlling power of Raspberry pi from android phone window is an advantage over traditional surveillance system as the position of the camera can be updated by the user and capture the image as per the user interest.

Frequent notifications may interrupt the User; by enabling the Android application to work in auto mode user receives notifications about the intrusion only when the user is out of desk.

1.2 Literature survey

The use of M2M communication is an advantage over traditional data acquisition system (DAS) as the monitoring and controlling can be done without human intervention. As the system becomes fully automatic the amount of error decreases. The use of machine to machine technology facilitates user to view the location from remote area. The GSM module is used for wireless communication where system collects the information from all sensor nodes on demand and provides it to the end user through wireless network. [1].

The advantage of sending push notification is explained when the system uses Raspbian OS as operating system. Raspberry Pi is a credit card sized portable stand alone device which is energy efficient and sends out signal when intrusion is detected. The captured image is sent to the user where user can view the captured image from remote location but controlling power of raspberry pi from window is not established [2]

The PIR sensors which detects the presence of human appearance which will notify the user using message through GSM and image captured by camera through email using internet. After checking the Email and image user has to take further decision. Rather than sending Email to the user, sending push notifications makes the job easy. So that there is no need to check the email very often [3]

A webcam is a mini video camera that has the capability to feeds or streams its image in real time to, or through a computer to a computer network. When the image is "captured" by the computer, the video stream is saved, viewed or sent on to other networks via systems such as internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into the computer hardware, such as laptops [4]

The web camera will capture the images and sends it to the server, server will compress those images and store it in database, When mobile will send request to server through GPRS the server will send those compress images to mobile through internet, where this procedure becomes complex. Rather than mobile sending request to

the server through GPRS, sending images automatically eases the operation [5]

2. Proposed work:

The proposed system has been designed to overcome the drawbacks of the previous security system and to improve the security, flexibility, efficiency. The Android Application works in two modes one is Auto mode and other is Manual mode, user receives the notifications only in Auto mode in order to avoid frequent interruptions. The Raspberry Pi . Web Camera is itself attached with rotating model which facilitates the user to capture the image of his interest. It contains all the essential software to include motion detection which enables the Raspberry Pi's camera to detect motion and save the image as well as view a live streaming of the location from the camera. A python script, then directs the Raspberry Pi to send push notifications every time a motion is detected.

The block diagram shows that the project is divided into two sections. The raspberry pi will be somewhere at a remote place, in surveillance area, spying the activities. And the controlling of it will be done from any part of the world through android application. The system consists of an USB camera to capture the image from the crime scene.

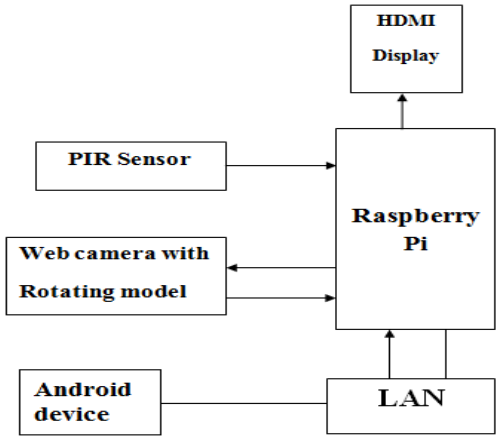

Fig -1: System Block Diagram

Interfacing

Initially the Raspbian Operating system is installed in the micro SD card. Then the micro SD card is inserted in Raspberry Pi kit and 5V power supply is provided. HDMI port is connected to the LED TV/Monitor and thus the display will be observed on LED screen. Keyboard and Mouse are connected to the Raspberry Pi USB ports, so one can write the code with the help of keyboard and mouse.

LAN cable is connected to the Ethernet port to access the Raspberry Pi and make the system interactive by sending and receiving E-mails. Web camera is connected to the Raspberry Pi USB port, Web Camera is also connected to the power supply. Finally the code is written for the proposed system in java language and notify user by sending push notifications.

User has to install the Android application in order to receive the notifications from the cloud. The Application is developed by using Android studio which uses Java language. JDK is used as compiler. After successful installation of App, user has to register the android phone under specific project so that user can receive relevant notifications. User has to register the android phone by clicking on the option Register, the request is sent to the Google for unique device ID.

Since Google maintains many projects, each project is given a specific project ID and under each project many devices are registered with unique device ID. Google sends unique device ID i.e., FCM Token to the user's Email ID, that token has to be copied in to the FCM token list, this procedure completes the registration phase. Admin also maintains data set of device ID, project ID and certificate details.

Fig -2: Raspberry Pi Installation Setup

PIR sensors detect the motion and sends positive signal to the Raspberry Pi. Raspberry Pi sends signal to the camera to capture the image, when the image is captured by the camera, the image is temporarily stored in the Raspberry Pi and it is sent to cloud for further processing. User can receive notifications only when App is in Auto mode but the user can view image and update positions in both Auto and Manual mode. When user updates the position of the camera the rotating model rotates the webcam according to the position updated and captures the new image which is sent back to the user

3. CONCLUSIONS

The IOT based smart surveillance system has been aimed to design in such a way that it can fulfill the needs of the user for particular surveillance area. It has countless applications and can be used in different environments and scenarios. When the motion is detected in the surveillance area the image is captured and GCM notification is sent to the user informing about the motion detection. User can view the image from the remote area with the help of internet or Wi-Fi connection. The user gets notification when the Application is in Auto mode.

From the comprehensive survey on existing surveillance system there is no work done on controlling power of Raspberry Pi from window. The controlling power of raspberry Pi facilitates the user to update the camera position from remote location by means of left and right arrows so that user can capture the image of his interest. Power management in the proposed system is efficient since the application works in background even the phone is in sleep mode. User can control the location from remote area by giving inputs from the android screen window in both Auto and Manual Mode. User can also update the position in Auto mode. In order to avoid unnecessary notification the user can receive notifications only when he is out of desk by selecting Auto mode.

In the future, live video streaming can be added. In addition with live video streaming, digital processing techniques can be implemented. Zoom in and Zoom out options can be added while updating positions of the camera. This system also enhanced in future by adding addition infrared emitting system at home, bank cabin to detect the people if they wore a mask on face.

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