Home Security using Vibration Sensor

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Abstract: Security is very essential now days as most people are at work and their homes remain closed for most of the time. So a need of a security system even when we are away from it is essential. In our project we are trying to provide a security system through which the owner and the members can keep an eye on their home while being away from it. This system uses a vibration sensor for monitoring vibrations. Vibrations occur when a thief or unwanted entry tries to break in the door/window and tries to enter. The controller (Node MCU) senses the vibrations and sends the values to Raspberry Pi. The Raspberry pi checks the values and compares with the desired set of values. If the input value is greater than the threshold value then it turns ON a buzzer and the Raspberry Pi controller sends a message to the desired owners of the system and the security department and it starts the video capturing of the scene. The owner can then live stream the video by simply typing the IP address of the Pi controller in the web browser. In this way the owner can take desired actions in the future.

Keywords: Vibration Sensor, Raspberry Pi, Node MCU, Live Stream the Video

I. INTRODUCTION

Considering the increased level of thefts in society, we are designing a compact and cost effective home security system. This system can be mounted at various place of entrance for house, like door or windows. In this project there will two parts of project, one part will collect the data from the vibration sensor and other part will be used to live video stream. In this project the main component is vibration sensor. This vibration sensor will be connected to controller and this controller will upload these values to a web page created for this purpose. A camera will be interfaced with other controller for live video streaming purpose. If someone tries to break through the door or window the vibration sensor will sense that level of vibration and will upload that information to the web page. At the web page a threshold value will be set to detect intense vibrations. If the received data from the vibration sensor is above certain predefined level, it will blow the alarm and at the same time it will send message to owner as well as security department and the owner can also watch or record live footage of what is happening at the door on his mobile phone.
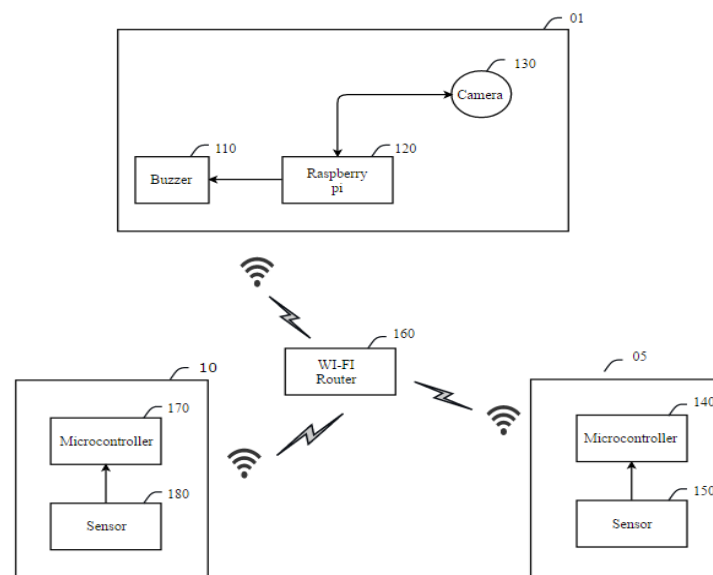
II. WORKING DESCRIPTION

Fig. 1 Block Diagram

The current invention is wholly dependent on WIFI internet. To communicate over WIFI internet the basic thing required is WIFI router 160. All the microcontroller 140 and 170 and the Raspberry Pi 120 will communicate with each other through WIFI router. So we can say that WIFI router is heart of the system. The vibration sensors 150 and 180 are connected to the microcontrollers 140 and 170 respectively. The readings from each sensor 150 and 180 will be taken by its respective microcontroller 140 and 170. These microcontrollers are connected to the WIFI router 160 wirelessly. The Raspberry Pi 120 has physical connections with a camera 130 and a buzzer 110.

The Raspberry Pi also have a wireless connection to the WIFI router. The connection between the camera and raspberry pi is bidirectional i.e. raspberry pi sends control signals to the camera and in return the camera sends data back to raspberry pi. This data can be image file or a video file depending upon the signal sent by the raspberry pi. The connection between the buzzer and the raspberry pi is unidirectional i.e. only digital signal either high or low is sent by the raspberry pi to the buzzer when it is required. The duration of operation for camera and buzzer are also sent along with activation signals.

The microcontrollers 140 and 170 continuously send the data that is received from the sensors 150 and 180 to the raspberry pi 120 through WIFI router 160. Base on the data received from the microcontrollers and the threshold set by the user, raspberry pi sends a text message and/or an e-mail to the user using internet. Also at the same time raspberry pi records a video of specified time and also controls the buzzer. After receiving a text message/e-mail if the user wants to view what is happening at the doorsteps of his/her house they can simply enter the IP address of the raspberry pi and view a live footage on their mobile handset having internet facility.

To view the video on their handset using internet, the ports of the WIFI router should be port forwarded, which can simply be done in setting options. Port forwarding is needed because the raspberry pi and mobile handset are on different internet connection. By forwarding ports we can get access of raspberry pi remotely.
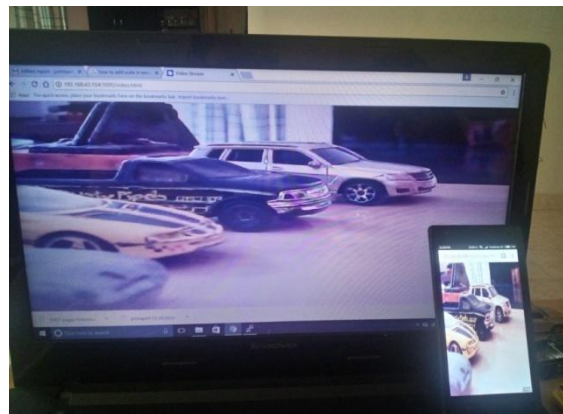
III.   RESULTS

Fig. 2 Live video streaming

As seen in above figure one can live stream as well as record the footage on their mobile handset as well as on their laptop
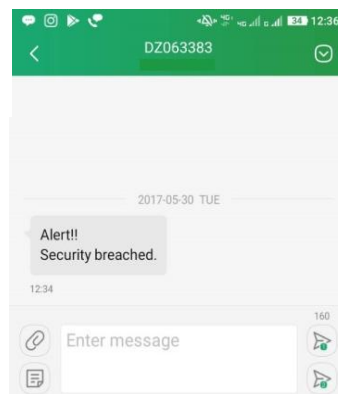

Fig. 3 Security Message

As seen in the above figure, the owners will receive the above message in case of security breach.

CONCLUSION

In our project, the vibration sensors are installed inside the house at the various entries viz. Doors and windows, the system cannot be breached or broken down or manipulated easily. This system has many combined features that are run over the internet and a limited hardware requirement is taken into consideration. For ex: GSM module is eliminated for the use of sending a text message and instead the message is sent over internet using way2sms website. So all the actions that are to be controlled are divided amongst only two controllers. This reduces the overall cost of the project and makes it economically viable.

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