Surveillance Monitoring System using Raspberry Pi

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Abstract— This paper deals with the design and implementation of surveillance monitoring system using Raspberry pi , CP Plus Camera and PIR sensor . It increases the use of technology to provide essential security to homes and other working areas. The proposed raspberry pi based security system captures information in particular area. Web application is used to access that information. when motion is detected, The cameras automatically starts recording and the Raspberry pi device alerts the owner of the possible intrusion by sending SMS or Email containing hyperlink of web application. Raspberry pi streams live video and records it for future playback.
Key words: PIR sensor, Raspberry Pi, mobile phone, CP Plus camera

I. INTRODUCTION

Security is very important thing in today's life. In order to maintain peace and provide security to people now a day's CCTV surveillance system (close circuit television) is used. Supermarkets, hotels, schools, factories are having their own CCTV for 24/7 monitoring. It gives real time monitoring, provides surveillance footage, and allows the authorities to have evidence against illegal activities. It can reduce the crime rate in the society. Although surveillance camera records video and helps the authority to identify the cause of an incident like crime or accident, it is just a passive monitoring.

Existing CCTV's are in continuous recording mode. So sometimes it will be wastage of memory. Covering angle of existing CCTV's is fixed. Some rotating cameras are available (Ex.PTZ) now-a-days but these are very costly. Sometimes wire of the analog CCTV is cut by the thieves or any damage in the CCTV take place then user does not get any information quickly. This Project mainly focuses on providing security when the user is away from his working area or the area he wants to secure. The intelligent system includes camera with Raspberry pi which sends SMS and email when sensor detects movement in particular area .this SMS or email includes alert message with hyperlink of image or video. User can easily access this image /video using his mobile to observe unwanted activity and can take action immediately.

II. FUNCTIONAL DESCRIPTION

The functions of the various components are given below:

A. Raspberry Pi

Raspberry pi is a small credit-card sized computer capable of performing various functionalities such as in surveillance systems, military applications, etc. The various functionalities of the components are given below The various components of Raspberry- Pi 2 (model B+ v1.1) are

- *SD Card Slot* is used to install OS/booting/long term storage The total memory of the SD card is about 8GB.
- *Micro USB Power Port* provides 2A at 5V.
- HDMI output is used. It is mainly used to carry audio and video signals. They are otherwise called as A/V jacks.
- *Audio Out* Digital audio is obtained if HDMI is used to obtain stereo audio. Here analogue RCA connection is used.
- *Ethernet: 100mb Ethernet Port is* used to connect to the Internet. It also plays a role in updating, getting new software easier.
- *HDMI OUT(High Definition Multimedia Interface)* is used with HDTVs and monitors with HDMI input. Also HDMI-HDMI is used here.
- *BROADCOM BCM 2836*: It is otherwise defined as System on chip .It is a 900 MHz quad core ARM cortex A7 Processor. It has a Video core IV 3D graphics core.
- *GPIO* allows us to control and interact with real world.

B. CP Plus Camera

CP Plus Camera captures the image and sends it to the Raspberry Pi board. The camera model used here is CP Plus Camera model.

III. HARDWARE ARCHITECTURE

The system contains PIR sensors and CCTV camera for capturing image. Whole system is controlled by raspberry pi. Raspberry pi has SD card slot, HDMI port. Mechanism of Rotating camera is used to increase the viewing angle. PIR sensor is motion sensor used to detect presence of human. When human is detected in the particular area then it will give signal to the raspberry pi. Raspberry pi processes signal and it will immediately sends a predefined SMS Containing Hyperlink to the authentic user .once user got the SMS he will be able to watch the entire scenario in his working area on his smart phone. Current sensing circuit is used to determine the functioning and status of camera. It is going to continuously check the supply for camera and status of the camera, Software module is used to ping the IP camera. If there is any change in the supply of the cable or CCTV itself damaged then raspberry pi send predetermined SMS to the authentic user.
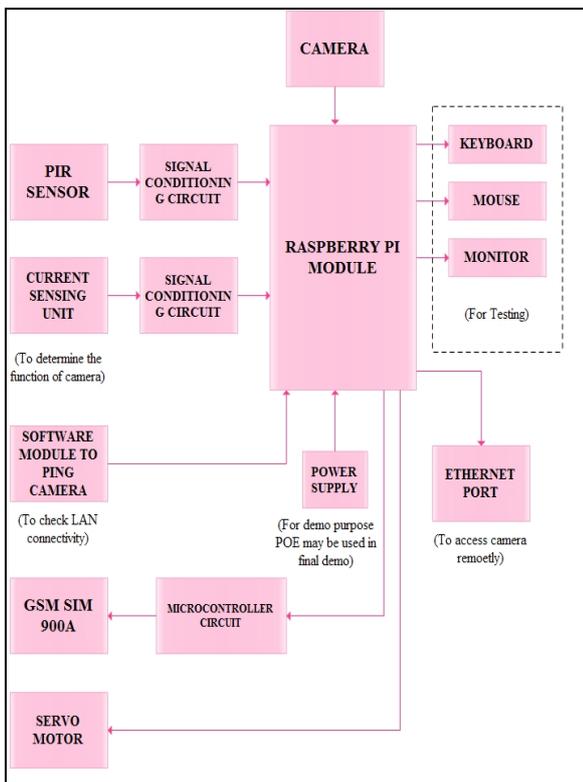
Fig. 1: Block diagram

IV. PREPARATION OF HARDWARE

1) Select raspberry pi model (Raspberry pi 2 model B).
2) Raspberry pi accessories(Keyboard, mouse etc).
3) CP Pluse IP camera.
4) servo motor.
5) Wi fi router / switch.

V. A. PREPARATION OF RASPBERRY PI

A. Download Software and OS

1) Download Sd card formatter (www.sdcard.org).
2) Download Win 32 Diskimager(http:sourceforge.net/project/win32disk imager).
3) Download Latest UBUNTU MATE OS (http://www.ubuntu-mate.org) .

B. Install Ubuntu Mate on SD Card

1) Formate sd card using sd card formatter.
2) Wright OS image file using Windisk32.
3) Insert sd card in to raspberry pi and configure language,location,keyboard layout,password.
4) To make use of full SD card memory.

VI. FLASK SERVER ON RASPBERRY PI

1) Install flask server on raspberry pi
2) Wright simple HTML page to control motor on/off, camera on /off .

VII. CONNECT CAMERA TO RASPBERRY PI

1) Make sure wifi dongle is connected.
2) Connect IP Camera to Router with CAT5 cable.
3) Switch on the Camera and Router.
4) ping the router.

5) IN Browser type IP address of Camera.

Fig. 2: Raspberry pi setup with camera module

VIII. ANDROID APPLICATION

1) Download android studio and 64 bit JDK
2) Refer tutorials point website to write android application using web view

IX. FUTURE WORK

1) Record a rtsp sream on raspberry pi.
2) capture image usindg raspberry pi.

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