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Solo IOT Devices to Capture Video and Audio Evidences

Rishi Shelly[1], Sarvesh Salvi[2], Neel Solanki[3]
[1, 2, 3]*Department of Electronics and Telecommunication Engineering, Thakur College of Engineering andTechnology, Mumbai, India*

Abstract: ***Due to an increased sense of security, such as CCTV and RFID, there has been an increase in video surveillance systems in public and private spaces in recent years. There are various flaws in video surveillance systems, including unclear images, complex structures, poor stability, the requirement for a lot of storage capacity to retain surveillance data, and relatively high prices. This study presents a real-time security surveillance system based on the Internet of Things. As a default programming environment, the system uses the Motion Detection algorithm developed in Python. This reduces storage requirements and lowers investment costs.. The algorithm for Motion Detection is being implemented on the Raspberry Pi 2 and Pi camera, which enables live video streaming with motion detection and alarm when motion is detected, as well as sending photographs and movies to a cloud server directly via the Pi camera. When the cloud is unavailable, the data is saved locally on the Raspberry Pi and delivered whenever the connection is restored. The camera is installed on the motor, and the user controls its movement (Left/Right) via an IoT webpage, giving the user a better view of the surroundings.***
Keywords: Internet of things, Pi Camera, Raspberry pi, Motion Detection.

I. INTRODUCTION

Video surveillance has advanced greatly over time and is now a critical tool for many organisations' safety and security needs [1]. These mechanisms are becoming increasingly crucial in ensuring social security. It is widely utilised in a variety of industries, including finance, public safety, banking, and the home. Traditional video surveillance can achieve close distance monitoring by employing a PC as a monitor host and connecting a monitor camera to the monitor host via a coaxial wire. Initially, analogue cameras connected through coaxial cables dominated the market[2]. There was a migration to digital switching systems for economic and performance reasons, and now IP-based data transmission is the standard.

Moving object detection and tracking are critical challenges for computer vision, especially in visual surveillancesystems. In most video surveillance applications, paying attention to a large region necessitates the deployment of omnidirectional or mobile cameras [3]. The Raspberry Pi chip serves as the microprocessor in this system. Video data is captured from a Pi camera, compressed into the MPEG format, transferred through the internet under control of the ARM Cortex a7 chip. Then the monitor client will receive the compressed data frame to restructure and recompose video images. IoT video monitor system provide a practicalsolution for remote wireless monitoring with low cost.

II. PROPOSED SYSTEM

The Raspberry Pi chip serves as the microprocessorin this system, while the Pi camera is utilised to take images of objects in the surveillance area. When the motion detection algorithm detects motion, the camera takes the image and sends it to the user via email server, as well as sending SMS notifications to the user's mobile phone via GSM modem. It also records video in the monitoring area, which is immediately sent to a cloud server (youtube). When the cloud is unavailable, data is saved locally on the Raspberry Pi and delivered whenever the connection is restored. We can accessthe live streaming video from camera on any web browser with the internet enabled device. The movement of the camera at the surveillance area is controlled trough IoT platform to increase coveragearea. This system's primary goal is to provide security for our houses as well as other control applications. The Raspberry Pi [4], Pi Camera, DC motor, GSM modem, MAX 232IC, and fire sensor are all part of the hardware module. Figure 1 depicts the proposed system's block diagram. The Pi camera module is directly linked to the Raspberry Pi board through the CSI (camera serial interface). This can be used to capture both high-definition videos and still images. The MAX232 IC, often known as the RS-232 Transceiver, is a hardware layer protocol converter IC. It is made upof a pair of drivers and receivers. The driver transforms TTL and CMOS voltage levels to RS232 voltage levels at a very basic level. These are used to communicate serially between the Raspberry Pi processor and the GSM module. The elevated temperatures in the surveillance area are detected bya fire sensor. For the detection of high temperatures, we use a thermistor in this system.

Generally we can't drive a DC motor directly with a microcontroller, as DC motor because it requires high currentand high voltage than a microcontroller. Micro controller usually operates at +5V or 3.3 V supply and it I/O pin can provide only up to 25mA current. Commonly used DC motor requires 12V supply and 300mA current, moreover interfacing DC motor directly with microcontroller may affect the working of microcontroller due to the back emf of the DC motor. For this reason we use L293D H-bridge circuit. It is a special circuit, by using the 4 transistors we can control the direction of DC motor. If we give logic bits 1,0 then current flow from VCC to motor positive after motor positive to motor negative and then flows to ground. Then motor rotates one direction .We may change the logic bit 0,1 then current flows from VCC to motor negative after motor negative to motor positive and then flows to ground.

Finally, the human movement is detected by the Motion Detection algorithm [6], the system triggers an alarm detecting the presence of unauthorized person in a specific interval of time and simultaneously sends a alert SMS through GSM modem to the user and send captured image to the registered email of the user later recorded video send to the cloud server that is happening in the surveillance area. Using IoT [12] we can monitor surveillance area to cover more distance. The setup Python Open CV script will automatically deliver video data streaming to cloud server. Here 5MP Pi camera module is used that can be capable of 1080p high definition video modes and still image, and it canconnect Raspberry Pi directly with CSI (Camera Serial Interface).

Hence it supports 2592x1944 image stills.

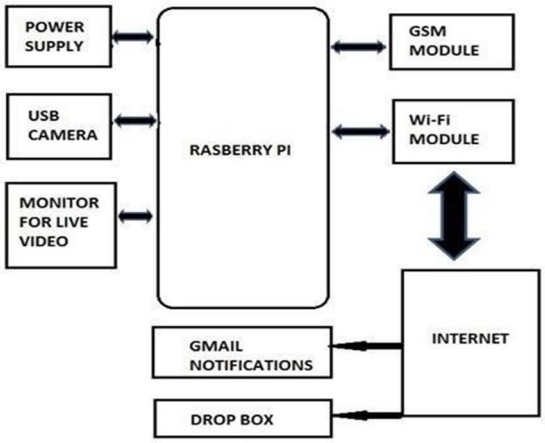
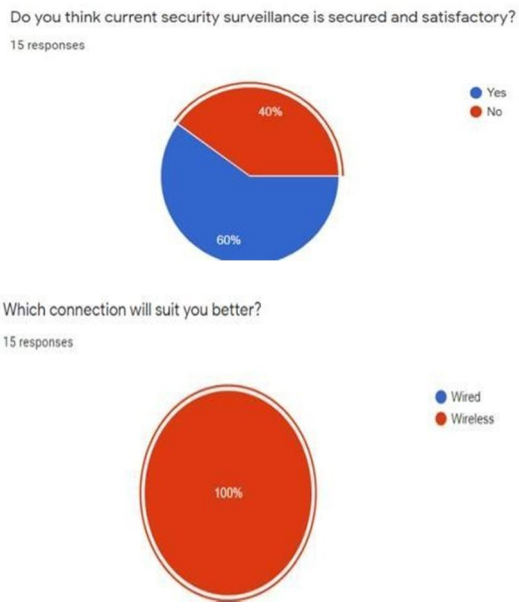
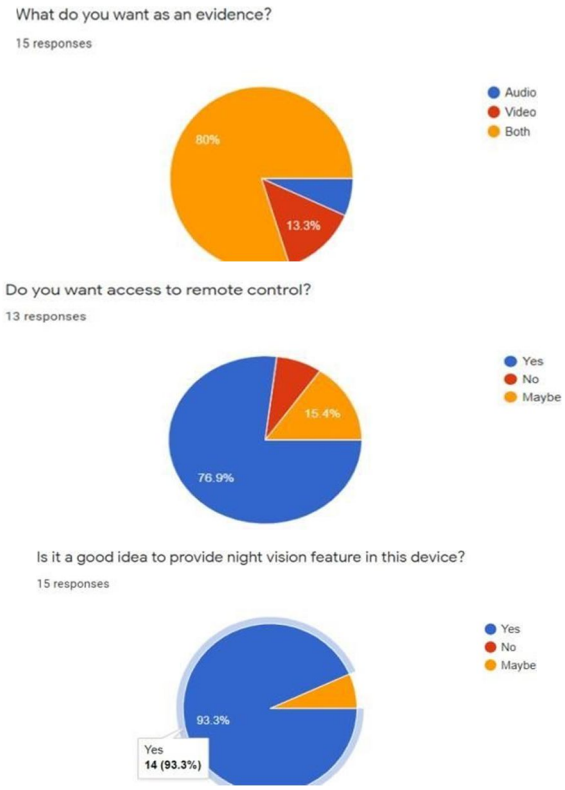


Fig. Block Diagram of proposed system

III. RESULTS FROM SURVEY





IV. EXPECTED RESULT AND DISCUSSION

As an output, the camera will send audio and video to the monitoring screen as soon as any movement is detected by the camera, and the camera will not be seen to the person because it is camouflaged. A notification or an alert will bedelivered to the device with software application whose coding is done in python environment as soon as the audio and video are displayed on the monitoring screen.The design and implementation of the proposed smart security surveillance system with IoT approach using the RaspberryPi done successfully. Tested fully developed system to demonstrateits feasibility and effectiveness

V. CONCLUSION

This paper provides a low-cost IoT-based security surveillancesystem. Home security and other control applications are provided by the suggested system. Users can identify, report, and monitor intrusion occurrences using a Raspberry Pi, GSM, and Pi camera. In addition, the system notifies the area and alerts the user, decreasing the amount of damage caused by burglary. The system's utilisation of a cloud network allows for the storing of acquired photographs and videos.

VI. FUTURE SCOPE

We intend to improve the Motion Detection algorithm in the future. The algorithm is reliant on the threshold value. It means that an algorithm's performance is improved when specific conditions are taken into account. And the system hasno way of knowing if the intrusion is by a known or unknownindividual, therefore we may keep the shift key near the user in the future.

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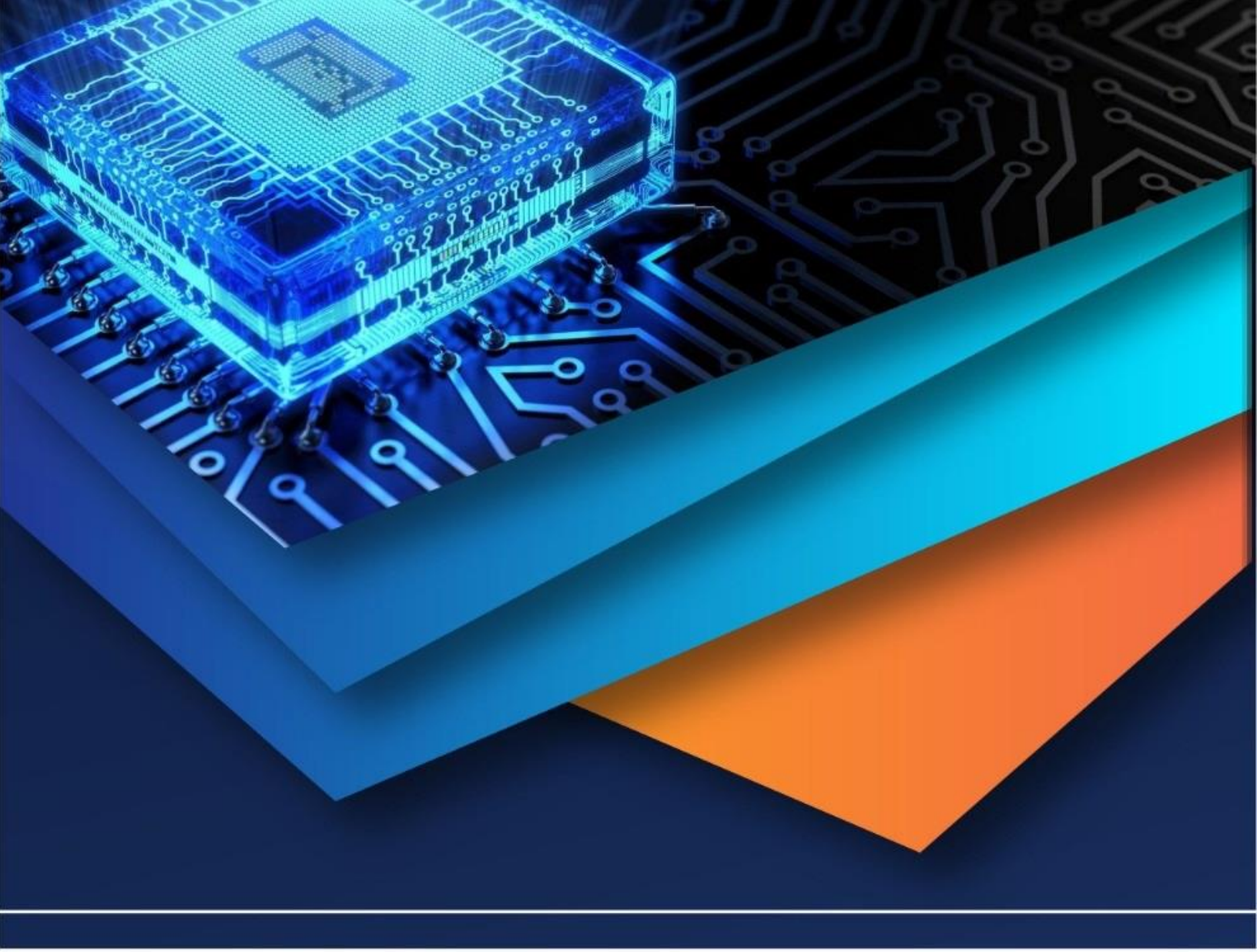

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