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# Automaton for Surveillance & Live Streaming

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**Abstract—**The momentousness of surveillance systems has increased tremendously due to the inflation of crime rates. It has become mandatory to have surveillance systems in every place. There are different kinds of surveillance systems used everywhere. One such is the PiBot which is a PiBot installed with a surveillance camera. PiBot provides continuous monitoring of a place and renders live streaming of the video. This PiBot can be used anywhere like office buildings, homes and also in places where human activity is forbidden. The PiBot uses a local area network using the Wi-Fi technology. Raspberry Pi 2 model B is employed in the PiBot which is interfaced with a Webcam for the purpose of live streaming. Thus, the data or video provided is processed by the MJPEG (Motion Joint Photographic Experts Group) streamer. The motion of the PiBot is controlled through the webpage developed using HTML. The wheels of the PiBot is programmed using the Python programming language.

**Keywords** - Surveillance, PiBot, Raspberry-pi, MJPEG streamer.

## I. INTRODUCTION:

With a treacherous increase in crimes today, everyone is worried about the safety may it be at office or house. This has led to a great increase in the use of various kinds of surveillance systems. With the advancement in technology, large number of people prefer the Internet Protocol (IP) based installations rather than analog systems. This is because IP installations are from anywhere. As to make the IP based systems affordable to all the people, there is a need to develop a system that is cost effective and portable. This paper describes the kind of surveillance system that uses a robot developed using the Raspberry Pi-2 model B. The Raspberry-Pi software makes the live streaming possible and also makes it easy to control the movement of the PiBot. The objective of the system is designed for nonstop surveillance and it also provides the live streaming of data. The flow of the paper will be Section II - Existing systems, Section III - Proposed Method, Section IV – Results & Future Scopes.

## II. Existing Systems:

On comparing with other surveillance systems, local network surveillance system is cost efficient. The core part of this system is Raspberry Pi or Arduino. The servers are connected to the Raspberry Pi through the switching circuit, which in turn consist of relays activated by web GUI (Graphical User Interface). The major drawback of local network surveillance system is that it cannot be controlled by internet rather IP based surveillance system provides solution as it can be controlled from any place irrespective of time.
Another prevailing method to control this system is by using analog systems which is comparatively less expensive and easier to operate than the IP - based system. Its drawback is that it large area and if the cameras are deployed in a particular place its hard and complicate to shift them to another location.
The other alternative method for controlling the system is by using RF technologies. The RF system is designed to monitor and control the system only in particular areas where the network is accessible. The drawback of this method is it is cost-intensive and difficult to implement as it produces noise since the antennas are voluminous. `

## III. PROPOSED METHOD:

We have proposed a system to build a real-time live streaming surveillance system using Raspberry Pi with installed Wi-Fi connectivity. In the recording phase, the pi camera will record the video of the location in real-time by feeding commands to the Raspberry Pi.

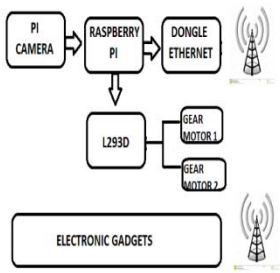


**Fig 1. Proposed Method Block Diagram**

These commands will be communicated through Wi-Fi. The drawbacks in those prevailing systems are overcome by using a single hotspot or Wi-Fi through which multiple devices can be connected. The pi camera used in this system provides high quality multidimensional images which reduces the number of cameras used in existing methods. We are working with server client model, through which we gets supports as installing and processing high resource software's which helps to achieve the primary objective.

**Fig 2. Pi Model 2 Board**

The vital control board of this system is Raspberry Pi 2 model B that will perform all the major operations. The Pi

camera sends the recorded images to it. This data transmission and reception is performed with the help of a Wi-Fi router. The DC motors that are attached to the wheels are controlled through the General-Purpose Input Output (GPIOs) Pins of Raspberry Pi via the Wi-Fi network. The signals for the control of the motor will be sent from the Pi to the microcontroller. The Raspberry Pi 2 has a 900MHz Broadcom BCM2836 ARMv7 quad-core processor with 1GB Ram, HDMI support, micro SD port and supports up to four USB devices.The other features of Pi also include expandable memory up to 1GB. Raspberry Pi is a 40 pin GPIO that enables multiple sensors, connectors and expansion boards to be added in which the first 26 pins are identical to Model A and B for full forward capability.

**DC Motor Driver:**

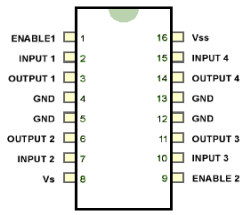


**Fig 3. L293D Motor Driver**

L293D is dual H-bridge motor driver integrated circuit(IC). The driver acts as a current amplifier because they take low current control signal and produces a high current signal which drives the motors. The DC Motors can be driven simultaneously i.e. both in forward and backward directions in common mode of operation. The motors are driven by input logics 2 & 7 and 10 & 15 pins. For the motors to start the Enable pins must be set high. When enable input is high, the drivers associated with it is enabled.

**DC Motors:**

**Fig 4. Motor to drive the robot**

**Pi camera**

Motors are mandatory for manoeuvrability of the PiBot. The motors are interfaced with Raspberry Pi by means of drivers in view of the fact that output ports of the microcontroller cannot source the desired amount of current. The motors are intact motive force systems comprising of an electric motor and a reduction gear train blended into, one easy to mount and easy to mould. This substantially minimize the obscurity, expenditure of designing and fabricating power tools, machines and gadgets calling for high torque at comparatively low shaft speed or Rotations per minute(Rpm).

**Pi Camera:**

The Raspberry Pi camera module can be exploited to capture high definition video as well as snapshots. It's simple to handle for beginners, but has lot to yield for advanced users to expand their knowledge. There are loads of illustrations where it can be applied for time elapse and capturing slow motion video. The camera is suitable for all forms of Raspberry Pi 1 & 2. It can be retrieved via MMAL ,V4L APIs and pi camera python library.

**KEY FEATURES:**

- 802.11 b/g/Draft-N is agreeable.
- Enhanced antenna efficiency that widens the range of wireless network.
- Upgrades major encryption methods like WEP, WPA and WPA2 encryption.
- Memory stick 2.0 interface for effortless instalment.
- Wireless access control-prevent unauthorized network access to network and computer.

**PROS AND CONS OF THE ENTIRE SYSTEM:**

**Pros:**

- The greatest benefit of the PiBot is that it is totally dependent on the Raspberry Pi which is a microcomputer.
- The PiBot is useful for organisation where high cost surveillance systems cannot be affordable.
- The PiBot can cover the entire auditorium or massive hall for surveillance.
- The PiBot arrives with all utilities and software required for live streaming and surveillance without any hesitation.
- Multi dimension surveillance is feasible.
- Usage of same hotspot and Wi-fi link.

**Cons:**

- To configure the PiBot the user has to move to the system each and every time.
- Distinct Wi-fi adapter is required in order to unite both the Raspberry Pi and the device to the same hotspot.

## IV. RESULTS:

The system has been enacted and certain outcomes were achieved:

- The PiBot was built with an option of real-time live streaming and recording system which works with Raspberry Pi and a wi-fi connection.

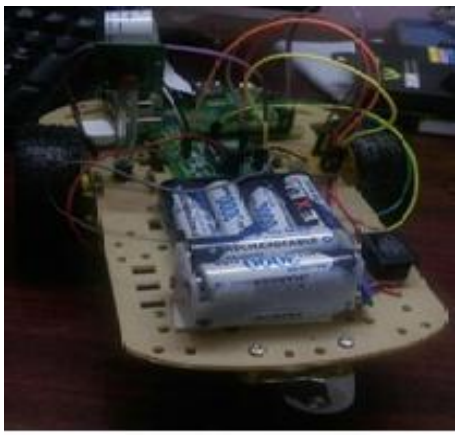

**Fig 6 Pibot**


**Fig.7 control panel**

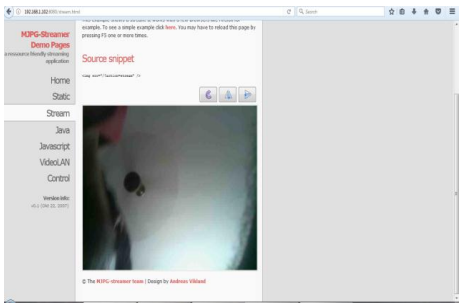


**Fig.8 video streaming**

- In the recording phase, the Bot will record the video of a preferred location in real-time. Video recording is done through commands from a computer to Raspberry Pi.
- Communication between the computer and Raspberry Pi will be done through a Wi-fi connection. A high quality video is recorded using the Pi camera.
- The hitches in the existing systems are overcome in this PiBot by using a Wi-fi (single hotspot) where multiple devices can be connected and also the Pi camera used in this system can record images in multi-dimension views which eliminates the need of multiple cameras.

## V. CONCLUSION AND FUTURE SCOPE:

The Bot thus designed, mainly aims at surveillance of sensitive areas or unreachable areas. This system is cost effective, affordable and it will be helpful for the user for surveillance of any kind of place. Further improvements that can be made is making the PiBot accessible through the internet. Hence, if the user wants to use the location, he can use mapping algorithms to map the entire environment and then automatically move after certain periodic intervals to monitor other areas.

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