iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** V **Month of publication:** May 2021

DOI: https://doi.org/10.22214/ijraset.2021.34315

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue V May 2021- Available at www.ijraset.com

Spy Robot for a Surveillance System

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Abstract: Surveillance in the entire country is a difficult task and is a key issue that can be equipped by new technological advancements. A robot which automatically detects trespasser and report for security can be used as an essential requirement. A Raspbian operating system-based spy robot platform with remote monitoring and control algorithm through IoT will save human lives, reduce manual error and provide protection. The spy robot system comprises components like Raspberry Pi, night vision pi camera, and sensors. It also contains an IR proximity obstacle sensor for detecting harmful objects. This surveillance system can be customized for various fields like industries, banks, shopping malls, and mainly on the international borders.
Keywords: Border security, Raspbian OS, IoT, Spy Robot, Raspberry Pi, PIR sensor, Obstacle Detecting Sensor.

I. INTRODUCTION

In today's world, the field of robotics is growing rapidly and some of the popular robotic products are used largely by the industries, defense, academic, and research communities. The design and implementation cost of a robot is very less compared to a human caregiver. The robots can be reprogrammed faster[1] and more efficiently. The robot has sufficient intelligence to cover the largest area to provide a secured space. Intelligent robots can perform preferred tasks in unstructured environments with or without human direction. Real-time object detection is required because safety and security are essential in remote monitoring and control systems such as intelligent home environments, consumer surveillance systems, and many more[3]. Real-time human body detection is essential for various fields like home security systems, surveillance systems, communication systems, and many more. Basically, the surveillance systems are building up with multiple cameras which are placed in different angles of view to track human objects[4]. Particularly the tracking task is needed on cameras for dynamic objects which increases the number of cameras used in the system. An intelligent surveillance system with multiple cameras is complicated and costly. In the proposed system, a single camera is installed on a robot and the robot can move all directions to take photos from different angles. This system is very flexible to monitor any living object with the help of the PIR sensor and it is more suitable for surveillance systems. A robot can be controlled in two methods by hardwired control or wireless control[2]. The wireless control provides additional benefits including increased flexibility and reduced installation cost. At the latest,
internet technology is used for movement control and all other purposes like images or videos captured by the robot and shared via the internet.

II. LITERATURE SURVEY

Sr no.	Name of paper	Author	Year of Publication	Limitation
1.	LOW COST SMART SECURITY CAMERA WITH NIGHT VISION CAPABILITY USING RASPBERRY PI AND OPENCV	Wilson Feipeng Abaya, Alexander C	2014	Here there was the need of extra LED illustrator circuit for the night vision. Due to the use of LED the cost would also increase. And incase if the LED is not working efficiently then it would create a problem in capturing live footage at nigt
2.	DESIGN AND DEVELOPMENT OF A MOBILE ROBOT FOR SURVEILLANCE AND RECONNAISSANCE	R. Karthikeyan	2015	Direction was not manually controlled by admin. Due to this it was not providing all the required information and was not efficient. Even the camera was not providing the night vision.
3.	DESIGN AND IMPLEMENTATION OF SURVEILLANCE ROBOT FOR OUTDOOR SECURITY	Meghana S	2017	There is no object detection included which is important as it would provide extra information and would help in recognizing the harmful objects.

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III. PROPOSED SYSTEM

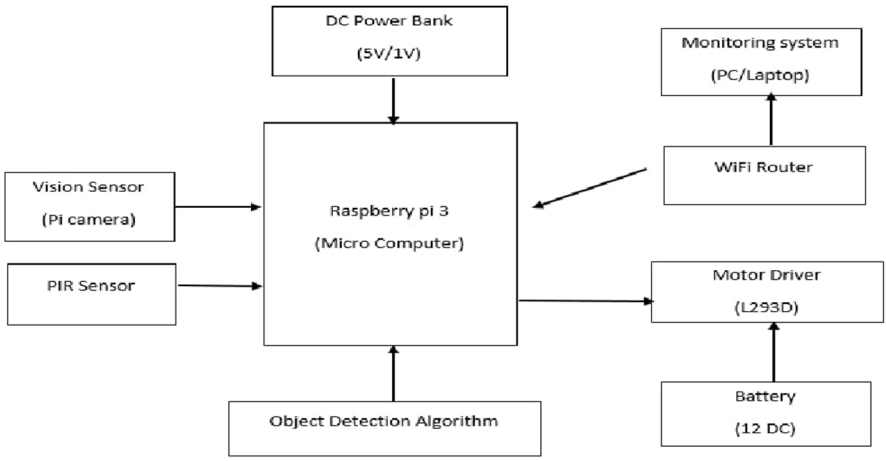
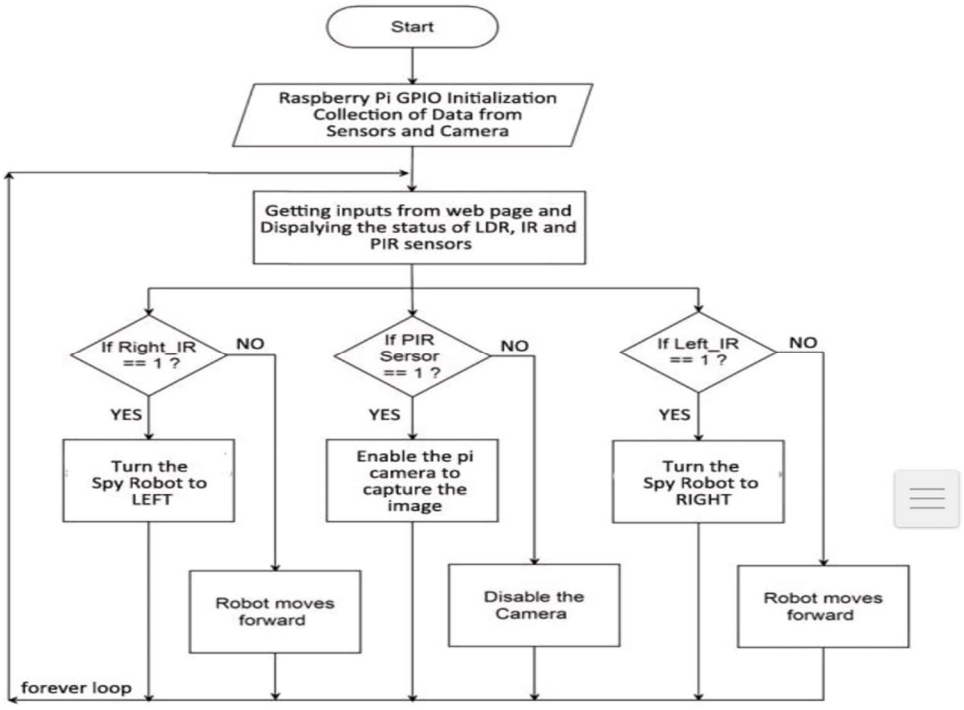


fig: Block Diagram of Architecture of the system

The spy system consists of some hardware and software components. Raspberry pi, Dc power bank ,Pir sensors ,Pc laptop, wifi , router motor driver and battery are hardware components and object detection algorithm is software part.
The pir motion sensor is connected to raspberry Pi which is the main component of the system. The Pi camera module is connected to CSI port of raspberry Pi. The DC power bank is used to provide the current to raspberry Pi module. The whole robot system is connected to motor assembly and two dc geared motor. The motor driver is used to control the motor speed and direction and battery is connected to motor to provide voltage and current. Wifi router is used for providing internet connectivity to the raspberry Pi and user unit. The user has to continuously monitor the movements on pc/laptop. And the object detection algorithm is used with raspberry Pi to detect the objects.

IV. ALGORITHM USED



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1) First we start the system and then the GPIO of raspberry Pi is initialized.
2) Then the spy robot gets the input from the website which is controlled by the user. According to the state of IR sensors the following conditions are checked.
a) If the logic of Right IR sensor is equal to 1 then there is obstacle detected and we have to move the spy robot to left side.
b) If the logic is 0 then robot will move forward.
c) Same if the logic of left IR sensor is equal to 1 then there is obstacle and we have to move spy robot towards right side.
d) If no obstacle is detected then the logic remains 0.
3) Then the next step is detection of living object by using PIR sensors.
a) If living object is detected then it will make logic to 1 and it will enable the Pi camera to capture the images. After this the captured images are sent to webserver via internet. The user at user unit is continuously monitoring the webpage.
b) If no living object is detected then the logic will remain 0 and Pi camera is disabled.
4) These steps are continuously ongoing in a loop and the user will continuously monitor and control the system.

V. CONCLUSION

The spy robot is use for the security and Surveillance purpose can operate in effective manner in order to collect the necessary information from risky areas. To detect suspicious activities near areas like border, banks, shopping malls etc. the system consist of different types of sensors like PIR and IR sensors. The most important component of our spy robot system is raspberry pi 3 minicomputer. The whole system is controlled and monitored by a valid user from remote place.

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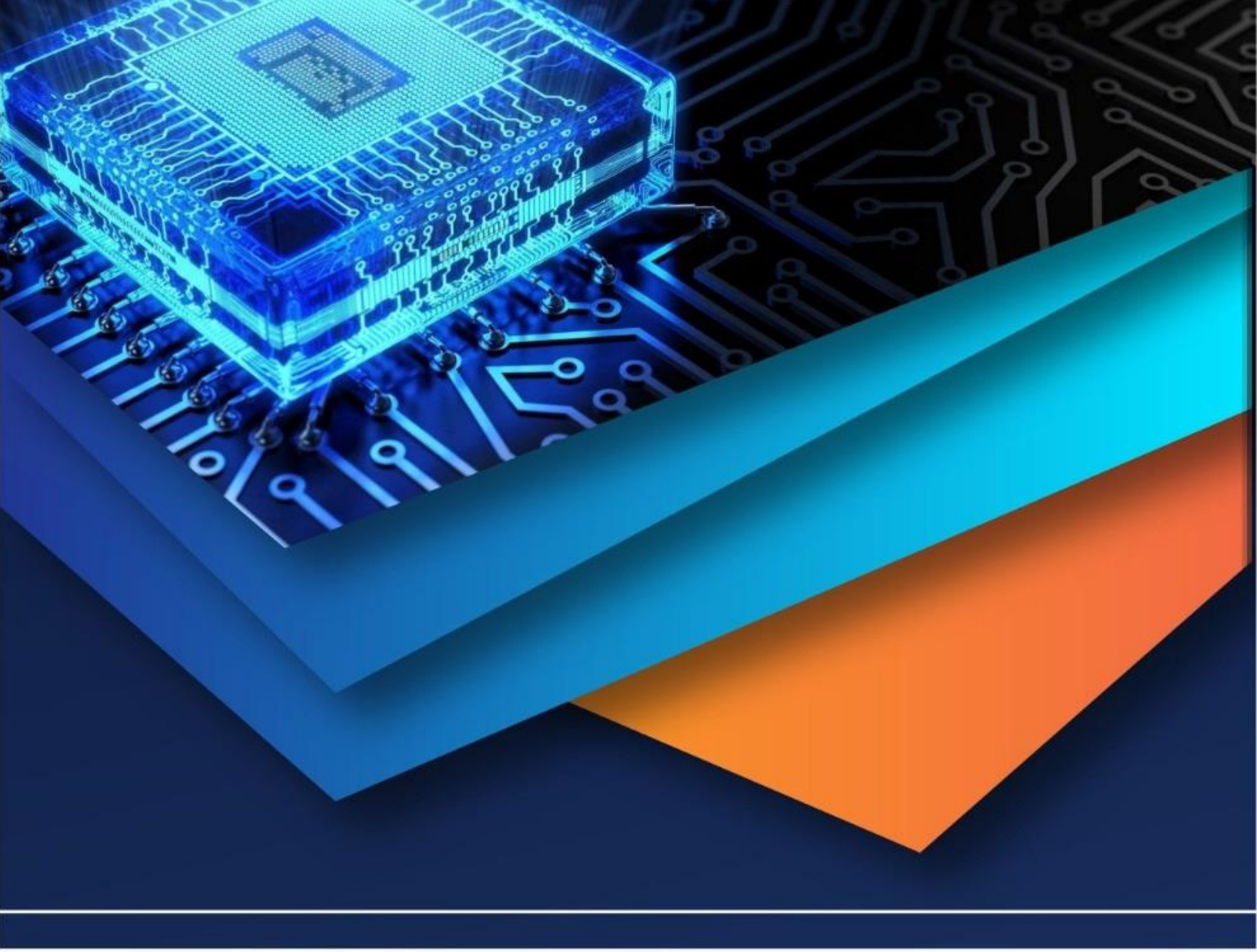

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