IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105097 |

E-Rakshak–The Border Surveillance Robot

Akshata Bhoir, Prajyoti Dhondge, Vaibhav Nalawade, Rutuja Chaudhari, Neeta Bankhele

UG Student, Department of E&Tc Engineering, Sharadchandra pawar College of Engineering, Otur, India

Assistant Professor, Department of E&Tc Engineering, Sharadchandra pawar College of Engineering, Otur, India

ABSTRACT: As we know the surveillance is a difficult task of international border areas. It is not possible by the border guarding forces to watch the border at each and Every moment. In this case the essential requirement is to have a system Security control unit. Nowadays, to carry out risky jobs the robots are used that cannot be done by the soldiers. In this present work, an Arduino - based spy robot platform with remote monitoring and control Algorithm through Internet of Things (IoT) has been developed which will save human live, reduces manual error and protect the country from enemies. The system comprises the Arduino (small single-board computer), camera, PIR sensor and shooting gun. The Arduino is the brain of the system. Android app control the moving to a specific direction and camera for live streaming videos of required areas for tracing and attacking. And the PIR sensor is activated depend on external stimuli via IoT.The user is able to access the system with control buttons on the android app from control room.

KEYWORDS: Arduino, IOT, PIR Sensor, 5 MP Pi-Camera.

I. INTRODUCTION

The main purpose of energy efficient algorithm is to maximize the network lifetime. These algorithms are not just related to maximize the total energy consumption of the route but also to maximize the life time of each node in the network to increase the network lifetime. Energy efficient algorithms can be based on the two metrics: i) Minimizing total transmission energy ii) maximizing network lifetime. The first metric focuses on the total transmission energy used to send the packets from source to destination by selecting the large number of hops criteria. Second metric focuses on the residual batter energy level of entire network or individual battery energy of a node. In military fields they always tried to use new gadgets and weapons for reducing the risk of them. Causalities and to defeat their enemies. The robotics product is used largely by the industries, defence, academic and research communities and it is growing exponentially. The robots can be reprogrammed faster and more efficient and its design and implementation cost is very less than hiring a human caregiver. The robot has sufficient intelligence to cover the largest area to provide a secured space and perform preferred tasks in unstructured environments with or without human direction. For safety and security, real time object detection is essential in the remote monitoring such as intelligent home environments, consumer surveillance system, etc. and the real-time human body detection is essential for home security systems, surveillance systems, communication systems and more. Basically, the surveillance systems are building up with multiple cameras which are placed in different angles of view to track human objects. The tracking task is needed on cameras for dynamic objects which increases the number of cameras used in the system. In proposed system a single camera is installed to take photos and stream videos because an intelligent surveillance system with multiple cameras is complicated and costly. The PIR sensor is used to monitor any living object and it is more suitable for surveillance systems. A robot can be controlled in two methods by hardwired control or wireless control. The wireless control provides additional benefits including increased flexibility and reduced installation cost. In latest the internet technology is used for movement control and all other purposes like image or videos capture by the robot and shared via internet. In proposed model the system's movement is controlled through android app.

II. REQUIRED COMPONENT

1. Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.

The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery.

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In 2019, Arduino released the Arduino Nano Every, a pin-equivalent evolution of the Nano. It features a more powerful ATmega4809 processor and twice the RAM.

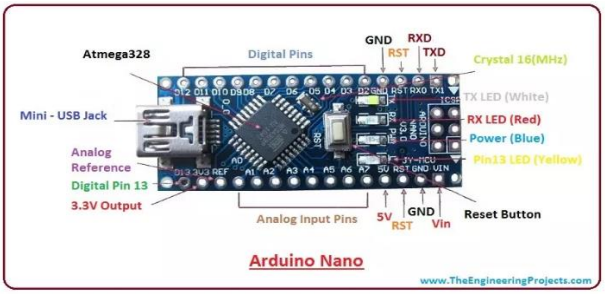

Fig 1.Arduino Nano

2. PIR Sensor

In 1920 PIR SENSOR was invented by Herbert Berman. It was great contribution in motion detection field. A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an active IR sensor is required. PIR sensors are commonly called simply" PIR", or sometimes" PID", for" passive infrared detector". The term passive refers to the fact that PIR devices do not radiate energy for detection purposes. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

Fig2. PIR sensor

3. MP Pi Camera

The Pi camera module is a portable light weight camera that supports Arduino nano. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects. It is commonly used in surveillance drones since the payload of camera is very less. Apart from these modules Pi can also use normal USB webcams that are used along with computer.

Fig 3. 5MP Pi camera

•PiCam Features

a) 5MP colour camera module without microphone for Arduino nano
b) MIPI Camera serial interface
c) Omnivision 5647 Camera Module 22
d) Resolution: 2592 * 1944
e) Supports: 1080p, 720p and 480p

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f) Light weight and portable (3g only)

4. DC Motor

200 RPM Centre Shaft Economy Series DC Motor is high-quality low-cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. The output shaft rotates in a plastic bushing. The whole assembly is covered with a plastic ring. Gearbox is sealed and lubricated with lithium grease and require no maintenance. The motor is screwed to the gear box from inside. Although motor gives 200 RPM at 12V but motor runs smoothly from 4V to 12V and gives wide range of RPM, and torque. Gives fairly good idea of the motor's performance in terms of RPM and no-load current as a function of voltage and stall torque, a stall current as a function of voltage.

5. Motor Driver L293D

The L293D is quadruple high-current half-H drivers. It is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

Fig4. L293D Driver

III. Block Diagram

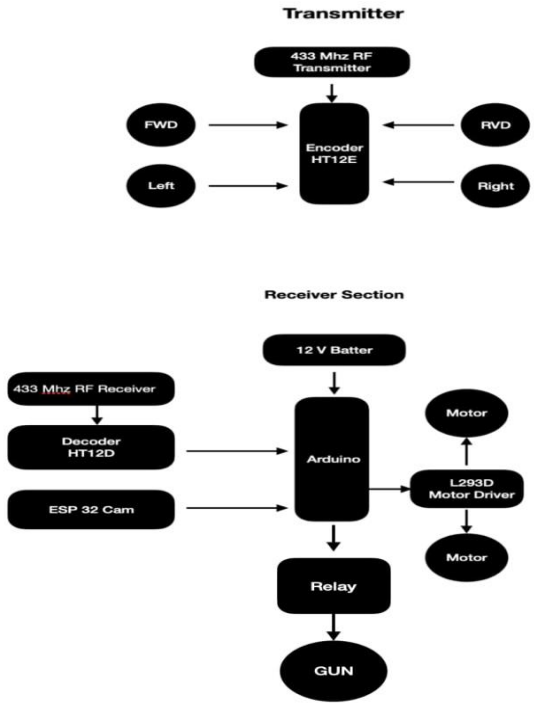

Fig 5. Block diagram of proposed system

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IV. WORKING

Arduino-based spy robot platform with remote monitoring and control algorithm through Internet of Things (IoT) has been developed which will save human live, reduces manual error and protect the country from enemies. The system comprises the Arduino Nano (small single-board computer), camera, PIR sensor and shooting gun. The Arduino Nano is the brain of the system. Android app control the moving to a specific direction and camera for live streaming videos of required areas for tracing and attacking. And the PIR sensor is activated depend on external stimuli via IoT. The user is able to access the system with control buttons on the android app from control room. it is work as per below flowchart.

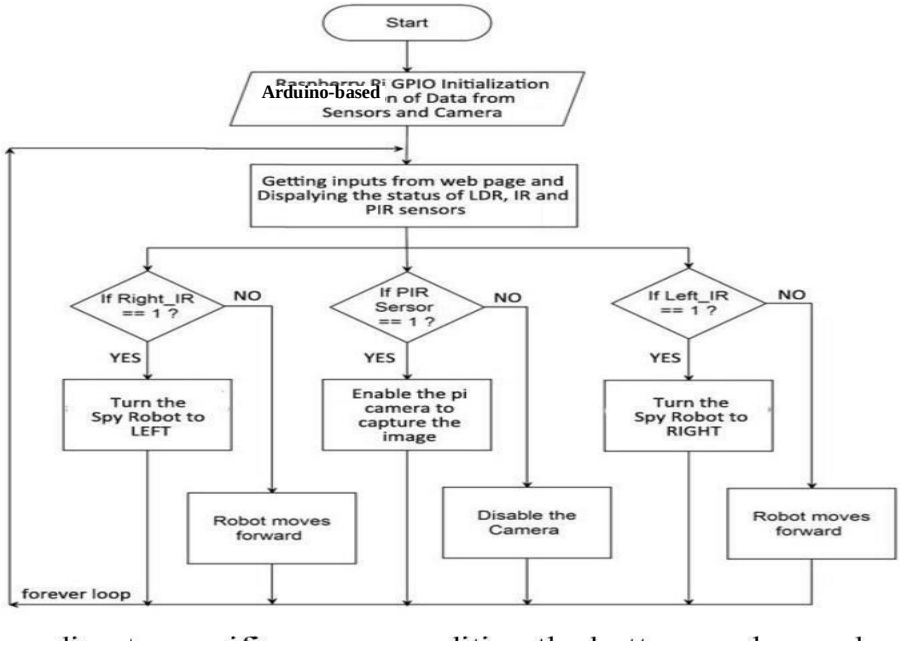

Fig 6. Flowchart of system

V. CONCLUSION

We know the real time condition of the border area without using any human source. The surveillance robot gives us live streaming video, according to that we can give the command. This proposed design used for security purpose can operate effectively in order to collect various types of information that required by users. The surveillance robot was designed with Arduino Nano. It monitors and secures a place among the adversaries that can be made by surveillance robots all the time with great accuracy. Camera is used which continuously monitors the robot surroundings and sends the information to the control station.

VI. FUTURE SCOPE

We need to include distance measurement and temperature along with night vision. We want to make this system as advanced system and compatible with all features.

The project future scope has numerous openings that could be prosecuted for various future applications for monitoring and control, etc. This robot can also be used in times of environmental catastrophes where the robot detects whether a living human being is present in that region. In domestic applications such as home security can also be implemented using this method.

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INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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