

## SPYROV (IoT based Surveillance Rover)

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**Abstract** - the major goal of this study is to create a method for conducting surveillance investigations in residential settings. Nowadays, mechanisms play an important part in our day-to-day operations, decreasing human labour and mistake. Robots can be operated manually or automatically, depending on the situation. This mechanism is designed to wander around and collect audio and video data from the environment before sending it to the user. During this project, the mechanism will be controlled by a mobile or portable computer via the Internet of Things (IoT), and live video streaming will be available both during the day and at night thanks to a wireless camera provided by the Rover. The ESP 32 camera chipset interfaces with the mechanism, allowing it to be operated manually through a Wi-Fi network.

**Key Words:** Arduino, ESP 32 Wi-Fi Module, IoT, Surveillance Rover.

### 1. INTRODUCTION

Surveillance cameras are used to keep an eye on public and private places, as well as to detect people. Although the effectiveness of this technology is debatable, it is rapidly becoming more prevalent and intrusive. At some point in the industry, surveillance cameras (also known as Closed-Circuit Television or CCTV) are increasingly being employed to monitor public and private places. Governments and private enforcement agencies have employed video surveillance in a variety of settings, including criminal investigations, city environment and government house security, visitor management, demonstration monitoring, and criminal investigations. This concept uses a robotic to provide a modern way to surveillance. The surveillance device is utilised for security purposes. This technology is intended to increase video surveillance, capture images, and preserve video frames for further verification. Video surveillance is a technique for keeping an eye on a situation, a location, or a person. The robot is operated by sitting in a comfortable position and carefully planning a strategy to deal with its sports. It gets a real-time posted picture from cameras and obtains photos from cameras via an internet browser. We have non-forestall streaming of the designated outdoor thanks to a Wi-Fi virtual camera connected to the robotic. With the help of an integrated light module on the ESP32

Chipset, surveillance can be carried out even in complete darkness. DC vehicles are connected to the microcontroller that controls the robotic vehicle's movements at the receiving end. If an operator correctly identifies an occurrence immediately, a time delay is unavoidable when intercepting an intruder by deploying a counter-reaction unit to the location. This robot is controlled by an ESP 32 microcontroller, which serves as the robot's brain. DC cars, wheel chassis, battery, and Wi-Fi module (ESP32) are all included in the robot. The mechanism is manually operated. The user interface connects with the mechanism through implementing the concept of the net of factors. This will be accomplished with the help of C++ code and the, which is commonly used in IoT development.

### 1.1 Existing System

In current systems, robots are meant to go along pre-determined courses that are incapable of recognizing obstructions and collecting pictures inside images. Some systems need wires to supply electricity, therefore they cover a smaller surveillance area and have a poor or limited amount of storage, necessitating careful storage management. Existing systems make use of robots that can only communicate in a limited number of ways since they rely on RF technology and Bluetooth. Short-range Wi-Fi cameras are used by a few current systems. Some robots will be fully controlled by a guide mode, which will require human supervision at some point throughout the police investigative process.

### 2. PROPOSED SYSTEM DESIGN

There are two parts to the system. The user portion will have a portable computer or mobile device to interact with the robot. As a result, using a mobile phone or a portable computer keeps the user fixed. Wi-Fi technology or the use of a Wi-Fi enabled device is used for communication. So, to put the idea into action, we may link the user area to the web, which is the Internet of Things' fundamental premise. The C++ connection code is used to connect the user system to the internet. So we can transmit commands and maybe manage the robotic car using this code.

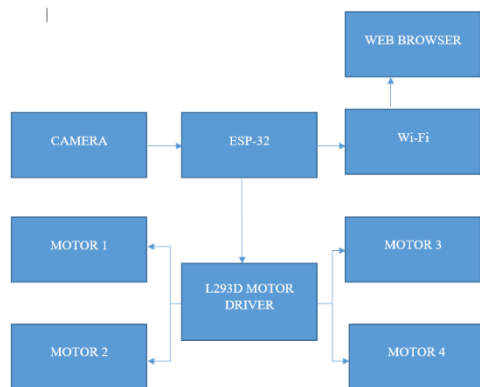


Chart -1: Block Diagram

We employ the adaptable ESP32 board on the mechanism's body or chassis, which is a vital element of the robotic vehicle, to finish the mechanism. The wheels are linked to DC below the chassis. To enable mobility, each motor requires 1.5 volts and an external power source. The motors were connected to the ESP through a motor driver. All four motors are controlled by a single motor driver. The microcontroller is programmed using the Arduino IDE to move the mechanism in the desired direction. This might be connected to the manual mode operation.

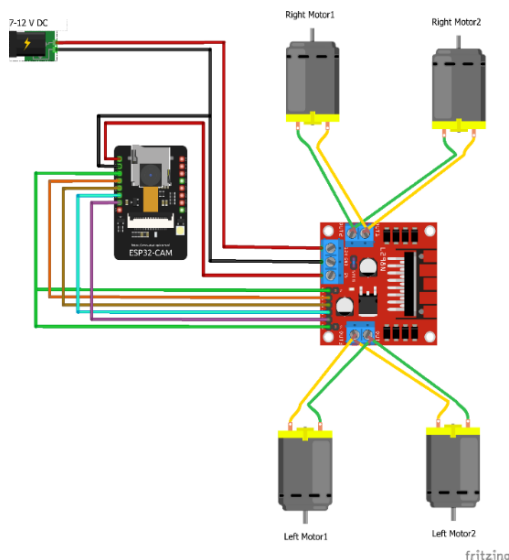


Fig -1: Circuit Diagram

### 3. HARDWARE USED



Fig -2: ESP 32 cam Board

#### 1. ESP 32 cam Board –

Espresif's ESP32-S SoC, a powerful, programmable MCU with out-of-the-box WIFI and Bluetooth, powers the board. It's the most affordable ESP32 dev board with an inbuilt camera module, MicroSD card capability, and 4MB PSRAM. Adding an external Wi-Fi antenna for signal augmentation necessitates additional soldering. Because the board lacks a standard USB connector, you'll need to upload your code using an FTDI programmer, an add-on HAT, or an Arduino UNO with the Arduino IDE/ESP-IDF DEV tools. Because it is a low-cost board with a tiny enough form factor, it is widely used in IoT and machine vision applications. According to an out-of-date spec sheet and numerous tutorial pages, the ESP32-CAM



Fig -3: USB-TTL converter

#### 2. USB-TTL converter-

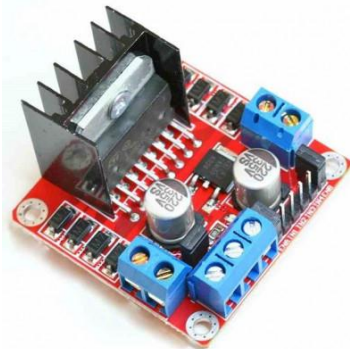
The USB-TTL module is a low-cost method of converting TTL signals to USB. The AN-USB-TTL module is instantly identified and installed as a native COM port when connected to a PC USB port, making it compatible with any existing serial communication programmer.



**Fig -4:** OV2640 camera module

3. OV2640 camera module-

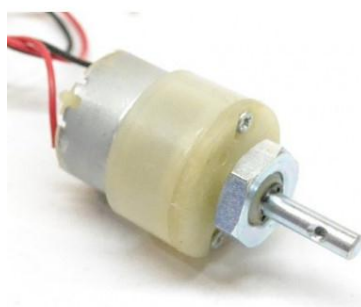
The OV2640 is a general-purpose camera module that can be used in low-cost embedded electronic systems to provide machine vision. It has a resolution of 2 Megapixels and enables on-chip JPEG compression.



**Fig -5:** L298 2A Motor driver

4. L298 2A Motor driver-

This high-power L298-based motor driver module is ideal for operating DC and stepper motors. It contains an integrated 5V regulator that can give power to an external circuit and uses the popular L298 motor driver IC. It can control up to four DC motors, or two DC motors with speed and direction control.



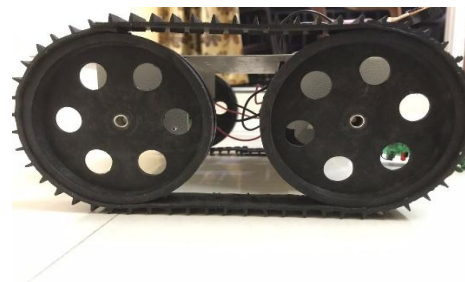
**Fig -6:** Geared motors

5. Geared motors-

Geared motors are usually a basic DC motor with a gearbox attached to it. DC Motor – 300RPM – 12Volts this can be used in all-terrain robots and variety of robotic applications. The center of the shaft of these motors has a 3 mm threaded drill hole, making it simple to connect it to the wheels or any other mechanical assembly. Robotics applications commonly employ 300 RPM 12V DC geared motors. It's simple to use and comes in a regular size.

6. Metal chassis-

Powder-coated metal chassis for robots is Advance Metal Chassis. Using a standard motor mount nut, the motors may be easily installed. It works using a Shaft Gear motor in the middle. The Chassis board is a mechanical frame construction for mobile robots that is frequently utilized. It is the robot's backbone, where everything such as motors, sensors, and wheels are arranged and connected.



**Fig -7:** Track wheel system

7. Track wheel system-

Tracks are an excellent alternative to robot wheels. They are constructed of polypropylene/rubber and are ideal for rough terrain. They are both light and dependable. The tracks are simple to put together. Tracked vehicles have a wider surface area in contact with the ground, hence they exert a lesser force per unit area on the ground than a typical wheeled vehicle of the same weight.

8. Antenna-

The ESP32-CAM includes an on-board Wi-Fi antenna, however an IPEX connection is available if you want to utilize an external antenna. Problems with sluggish video streaming web servers and other connectivity issues can be solved by using an extra antenna.

9. Orange 11.1 V battery-

This battery pack contains ICR 18650 2000mAh 20C Lithium-Ion Batteries of the highest quality with a BMS circuit. The battery pack may be directly charged with the DC power Adapter thanks to the integrated Charge protection circuit, eliminating the need for specialist battery chargers and the risk of overcharging.

#### 4. SOFTWARE USED

##### 1. Arduino IDE-

The Arduino Software (IDE) features a text editor for writing code, a message area, a text terminal, a toolbar with buttons for basic operations, and a series of menus. It connects to the Arduino hardware, allowing it to upload and interface with scripts.

##### 2. Fritzing-

Fritzing is an open-source project that aims to create hobby CAD software for the design of electrical hardware in order to assist designers and artists who are ready to progress beyond prototyping to making a more permanent circuit.

#### 5. CONCLUSION

In this paper, we have presented a solution that might add ease to superior living in our human lives. By Inception - Integration of intelligent technologies here we successfully procured a system that would act as the third eye, pretending our human presence artificially. Thus it will provide surveillance, from one place to another just by some simple touch across our workspaces, residential - commercial, and abandoned areas enabling attention towards safety. Thus concluding the presented Paper: SPYROV the vision behind this device was to achieve remote-controlled surveillance transmission.



Fig -8: Web Page Interface

As deriving observations from the base analysis, the GSM tech-based Dual Tone Mid Frequency (DTMF) module was implemented resulting in slow data transmission. Hence by using the most efficient technology i.e. IoT (Internet of Things) we successfully developed the SPYROV which acquired the main propositions of Remote access with the

synchronization of live media streaming in terms of an agreement to guardian protocols which were meant to be achieved. Thus all-terrain ease locomotion is been achieved with integration into an assigned area comprising an internet web chain for the designed purposes of surveillance with remote operations.

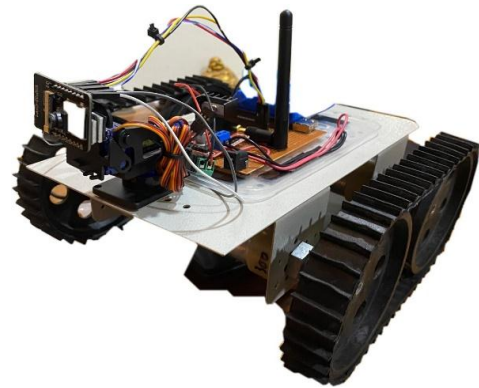


Fig -8: Completed Design.

#### 6. FUTURE SCOPE

Using real-time servers, to control the robot from anywhere in the world. We can create self-propelled patrolling robots that move at regular intervals without the need for an android application to operate them.

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