



# WIFI CONTROLLED SURVEILLANCE CAR USING ESP-32 CAM-MODULE

MR.C.VIJAYA BHASKAR,G.AMARNATH, K.ANITHA, C.DEDEEPPYA, A. DINESH, P.GANESH  
SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY, PUTTUR,CHITTOOR, INDIA

**Abstract :** The Wi-Fi-controlled surveillance car is a remote-controlled vehicle equipped with an ESP32 cam module. This module combines a microcontroller and a camera, allowing users to control the car's movement and view live video footage remotely. By connecting to a Wi-Fi network, the car can be controlled using a smartphone or computer. The ESP32 cam module captures and streams video feed, providing real-time surveillance capabilities. With its low cost and easy-to-use interface, it provides convenient and flexible solutions for anyone who needs to monitor their surroundings remotely and surveillance applications.

**IndexTerms - ESP 32cam, motor driver, camera.**

## I. INTRODUCTION

The development of surveillance robots has been a growing area of interest due to its applications in various fields such as security, industrial monitoring, and home automation. The surveillance robot using the ESP32-CAM is a project that focuses on developing a low-cost and efficient surveillance robot for indoor and outdoor use. Surveillance robots are becoming increasingly popular in modern times due to their ability to monitor and collect information from a remote location. The use of the ESP32 CAM module, which is an integrated camera module with Wi-Fi and Bluetooth connectivity, has made it possible to create surveillance robots that can be controlled remotely.

The ESP32 CAM module is a small-sized camera module that can be easily integrated into a robot. The module provides high-quality images and can be controlled using the ESP32 microcontroller. The ESP32 CAM module also has Wi-Fi and Bluetooth connectivity, which allows for easy communication with remote control station or a computer. With the ESP32 CAM module, it is possible to create a surveillance robot that can be controlled remotely from a computer or a mobile device. The robot can be programmed to move around a specific area and capture images or videos of the surroundings. The images and videos can be transmitted wirelessly to the remote-control station, where they can be viewed and analyzed in real-time.

The use of the ESP32 CAM module in surveillance robots has many advantages, including the ability to capture high quality images and videos, the ability to control the robot remotely, and the ability to transmit data wirelessly. Additionally, the ESP32 CAM module is easy to use and can be integrated into a robot without requiring any additional hardware. Overall, the ESP32 CAM module is an excellent tool for creating surveillance robots that can be used in a variety of applications, including security, monitoring, and inspection.

## II. RELATED WORK

[1] IOT Based Smart Surveillance System. This paper is presented by M Sri Lakshmi., C Padma IOT technology is being used in almost each and every aspect in this modern world. This paper elaborates the way of using the power of IoT in the field of Surveillance. The IoT based surveillance systems enable the user to view the activity from a remote location. It also facilitates the user to receive notifications whenever the intrusion is detected with the help of sensors connected with the surveillance cameras. This reduces the human intervention in the Surveillance monitoring and reduces the errors of manual surveillance.

[2] Implementation of Closed-circuit Television (CCTV) Using Wireless Internet Protocol (IP)Camera. This paper is presented by A Michael F Adaramola. In this paper, the implementation of Surveillance camera using Wi-Fi based technology is presented. The live streaming of video based surveillance can be adapted for the image detection and tracking for real-time intelligent surveillance system design

[3] A Wireless Controlled Surveillance Robot is a robot that is capable of carrying out a complex series of actions automatically, specifically programmable for the required task. A robot can also be controlled by a human operator from a faroff place.

[4] The project mainly aims on how to build an autonomous robot, in this case a Pick and Place Robot using Line Tracking. This project proposes three main parts which are electric circuit, mechanical design and programming. To build a good autonomous robot, the robot must also be very easily and freely controlled by the user to make sure it can perform well. Generally, this robot

will be used to pick and place objects, for some applications like moving a container from one area to another in a factory or placing components onto the PCB's. The robot uses several sensors to guide the direction which has been lined with black tape and the robot uses several motors for moving. This project focuses on the usage of PIC controller, a motor for motion and sensor for line tracking. The robot functions are fully controlled by a software program

[5] 10T Based Facial Recognition Security System. This paper is presented by Prashanth Bairaj Balla, K.T. Jadhao. The main purpose of this paper is to set as an alert for home visitors and provide information about the visitors in a dynamic website and phone application. The alerts are sent based on the data acquisition using sensors and the alerts of intrusion or thefts, will be sent to the registered user along with the picture of the incident using a camera module.

[6] A mobile-based home automation system. This paper presented by M. van Der Werff, X Gui, W.L. xu, Massey University, New Zealand; They presented a system that included a java-enabled phone, a cellular modem, and a controller board with a microcontroller. A user can interact with the home automation system using their cell phone as a remote control.

[7] Design and Implementation of Home Automation System. This paper is presented by A. Alheraish, Member, IEEEA remotecontrol system is designed and implemented using the GSM cellular connection network. This design incorporates the controlled device, the microcontroller, and the GSM Module, allowing it to be used in a variety of applications. Instead of a microcontroller, the proposed M2M system in this study uses a PC as the terminal use

[8] Design and Implementation of UPnPBased Surveillance Camera System for Home Security. This paper is presented by Yi Gu, Myoungjin Kim Division of Internet & Multimedia Engineering, Konkuk University, Seoul, South Korea. The main focus of this article is on the rapid development of mobile devices and Internet services, and how these devices and services might be used to manage home security. We propose the UPnP-based Security Camera System (USCS), which uses UPnP technology to search, operate, and administer IP-based cameras, to broaden the range of usability of traditional home surveillance cameras.

[9] The project deals with the wireless sensor-based remote control of mobile robots motion in an unknown environment with obstacles using the bluetooth wireless transmission and Sun SPOT technology. The Sun SPOT is designed to be a flexible development platform, capable of hosting widely differing application modules.

[10] Wireless Control Surveillance Robot, This project describes a new economical solution of robot control systems. In general; the Robots are controlled through wired network. The programming of the robot takes time if there is any change in the project the reprogramming has to be done. Thus they are not user friendly and worked along with the user preferences. To make a robot userfriendly and to get the multimedia tone in the control of the robot, they are designed to make user commanded work. The modern technology has to be implemented to do this.

[11] Surveillance robot using Arduino, Surveillance is the method for observing a location, an area or a person for protection and security purpose. This activity always happens in a military, police, public places and even in houses nowadays for monitoring and to control the illegal activities. Especially, the surveillance activity is used mainly for human because the people were doing all illegal work against the government and at the same time to protect them from those activities. The advent of technology Has brought a revolutionary change in the field of robotics, especially in the automation sector. The usage of robotics is increasing day by day, which reduces the human work.

[12] Surveillance Robot using IOT, Surveillance of human activities or any suspicious activities in war field and border lines with the help of a robot based on 10T technology as human access is not possible everywhere and if possible can lead to risk of losing life. Surveillance takes place through wireless camera interfacing with Arduino and various WIFI/Bluetooth module is used for communication that is controlled from a distance by Smartphone or a PC. Wireless camera sends the real time video signals. Robot also collects data from various sensors send it to micro-controller. The movement of robot is controlled by the user through a Smartphone or PC. The robot is fully capable to work as required in defence areas as it can be controlled automatically and manually both. According to security perspective this robot is very useful not only in defence but also in domestic areas too.

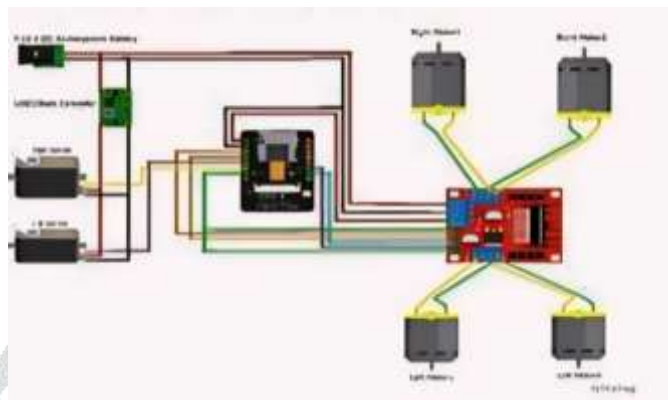
[13] Border Surveillance Robot, Border security provides regional monitoring, immediate warning and border patrolling management. For a long time, this has been a major problem to protect the country's boundaries against terrorists, illegal immigrants, illegal trades etc. Currently, most of the military monitoring services lack the required standard's, which is not up to expectation, leading to border soldiers' lives being put in constant danger. So as to decrease the soldier lives being lost and to improve the surveillance standards there is need for a system which can effectively monitor the border with locomotion and surveillance capabilities.

[14] Military Surveillance Robot, Surveillance plays an important role in border areas to keep eye on enemies. In such situations it is difficult to allow duty of surveillance to a soldier, which may cause dangerous to the life on one. Rather we can use a robot to keep eye on border areas. So in such cases this kind of robots are very useful they are small in size and provided with many abilities so they can perform the duty of surveillance and spying perfectly. In case if they found by the combatant, they have no identity to whom they belong. Military on border area are facing many problems so this kind of technology help them to aware about the opponent activities, so they can take further decisions.

### III. PROPOSED SYSTEM

The proposed system combines the ESP32 CAM module, motor control, Wi-Fi connectivity, and a user-friendly interface to create a Wi-Fi-controlled surveillance car with live video streaming, and remote- control capabilities. It provides a versatile and convenient solution for surveillance and monitoring purposes.

### IV. CIRCUIT DIAGRAM



### V. HARDWARE COMPONENTS



Fig-ESP32cam module

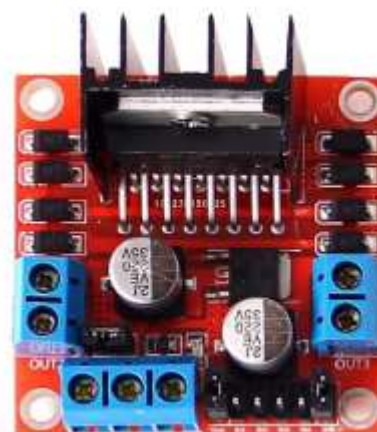


Fig-L298N motor driver module



Fig-Pan tilt servo assembly





Fig -4SG90 servo motor



Fig -7UBEC or buck converter



Fig - Arduino Uno for uploading code



Fig -4WD car kit



Fig – 7-12 V Rechargeable battery

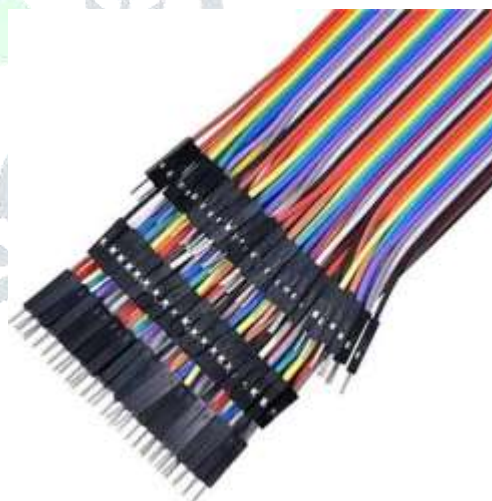


Fig – Jumper wires

## VI. SOFTWARE USED

IDE, which stands for Integrated Development Environment, is an official Arduino.cc software that is primarily used for authoring, building, and uploading code to the Arduino device. Almost all Arduino modules are compatible with this open source software, which is simple to install and begin compiling code on the fly.

**STEP 1: HOW INSTALL ARDUINO IDE:** You may get the software from the Arduino website. As previously said, the software is available for popular operating systems including as Linux, Windows, and MAX, so make sure you're downloading the relevant software version for your operating system. If you want to download the Windows app version, make sure you have Windows 8.1 or Windows 10, as the app version is not compatible with Windows7 or earlier versions of Windows.

The IDE environment is mainly distributed into three

1. Menu Bar
2. Text Editor
3. Output Pane

As u download and open the IDE Software it will appear like an image below



Fig 6: Arduino IDE Environment

**Step 2:** How to select board: To upload the sketch, you must first select the appropriate board and the ports for that operating system. The figure below shows what happens when you click Tools on the Menu

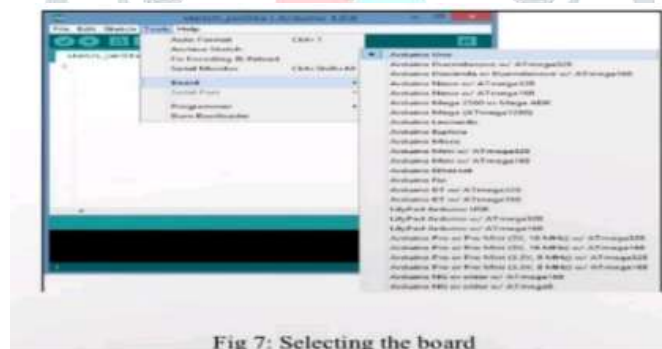
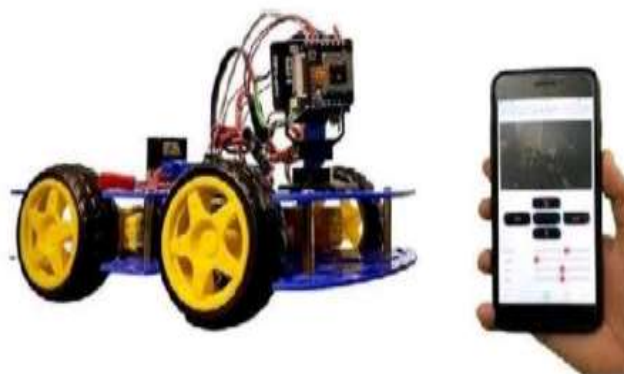


Fig 7: Selecting the board

## VII. KIT DIAGRAM



## VIII. RESULT

A surveillance robot using an ESP32 Cam is a powerful and versatile device that can be used in a variety of applications. Whether you want to monitor your home or office, keep an eye on your pets, or even use it in industrial settings, the ESP32 cam has the features and capabilities to get the job done

## IX. CONCLUSION

In conclusion, the Wi-Fi-controlled surveillance car utilizing the ESP32 cam module offers a versatile platform for remote monitoring and surveillance applications. Throughout the project, we successfully project, implemented live video streaming capabilities over Wi-Fi, enabling users to remotely navigate the car and capture real-time footage

## X. REFERENCES

- [1] CM Srilakshmi, Dr M C Padma" IoT Based Smart Surveillance System" International Research Journal of Adaramola, Michael.A.K.Adelabu "Implementation of Closed-circuit Television (CCTV) Using Wireless Internet Protocol (IP) Camera" 1.School Of Engineering, Lagos State Polytechnic,Ikorodu.P.M.B. 21,606, Ikeja. Lagos. Nigeria
- [2] Kunal Borker<sup>1</sup>, Rohan Gaikwad<sup>2</sup>,Ajaysingh Rajput<sup>3</sup>."WIRELESS SURVEILLANCE ROBOT" International Journal of Advance Research in Computer Science and Management Studies ISSN: 2321—7782, Volume- II, Issue-II, February 2014.
- [3] DheepakMohanraj, MICROCONTROLLER BASED AN AUTONOMOUS WIRELESS LINE TRACKING ROBOT, International Journal of Advanced Engineering Research and Studies EISSN2249-8974.
- [4] Prashant Bairaj Balla , K.T.Jadhao "IoT Based Facial Recognition Security System" International Conference on Smart City and Emerging Technology (ICSCET) Volume:01 Issue:041 May- 2018.
- [5] M. Van Der Werff, X. Gui and W.L. xu,"A mobile based home automation system," 2005 2nd Asia Pacific conference on Mobile Technology, Applications and systems, 2005,pp.5,doi: 10.1109/MTAS.2005.207158.
- [6] A. Alheraish, "Design and implementation of home automation system," in IEEE Transactions on Consumer Electronics, vol.50,no.4,pp.1087- 1092,nov.2004,doi: 10.1109/TCE.2004.1362503
- [7] Y. Gu et al., "Design and implementation of Upnp-Based Surveillance Camera system for Home security",2013 International conference on information on science and Applications (ICISA),2013,pp.4,doi:10.1109/icisa.2013.6698209
- [8] Mester, G. Wireless sensor-based control of mobile robots motion, Intelligent Systems and Informatics, 2009. SISY '09.7th International Symposium on.
- [9] Wireless Control Surveillance Robot, done by Shaikh Shoeb, Mir Ibrahim, Ansari Asagr Ali published in International Journal of Advance Foundation and Research in Science and Engineering, 2015.
- [10] Surveillance robot using Arduino, done by N. Pugazhenthil, K. Vinu Lakshmi, V. Preneeth published in International Journal of Innovative Technology and Exploring Engineering, 2019.
- [11] Surveillance Robot using IOT, done by T.Akilan, Princi Kumar, SatyamChaudhary published in International Journal of Research in Engineering, Science and Management, 2020.
- [12] Border Surveillance Robot, done by Sabiya Sultana, D. Shalini, Prashanth Varma, V.SriCharan published in International Journal of Advance Research, Ideas and Innovations in Technology, 2020.
- [13] Military Surveillance Robot, done by Abhijeet Dhule, Neha Sangle, Supriya Nagarkar, Asmita Namjoshi published in International Research Journal Engineering and Technology, 2020.P