International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Special Issue: 1 Volume No.7 April – 2023
DOI:10.46647/ijetms.2023.v07si01.042 ISSN: 2581-4621

WiFi Spy Surveillance Rover Using Esp32 Cam

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Abstract
The main aim of this project is to develop a mobile-operated spy rover using an Esp32 microcontroller. In this spy rover, the camera was mounted to operate the vehicle, which acquires and sends video to mobile. A microcontroller and camera are responsible for controlling the movement of vehicles. Our idea is to make a rover to tackle the hostage situation & the worst conditions which a human being cannot handle. Humans being held hostage are relocated to a safer place away from situations that may pose a threat to their safety. This system can perform many security and surveillance functions more effectively than humans.
Keywords: *ESP32-CAM camera module, smartphone, wireless OV2640 camera, motor driver, FTDI module.*

I. INTRODUCTION

With the quick development of information technology, many video surveillance systems are now widely used in daily life for security and surveillance purposes. One example of how video cameras relay visual signals to a constrained number of displays is closed-circuit television (CCTV), also called video surveillance. When CCTV was first introduced, its use was constrained by its poor quality and expensive installation. At places that need to be watched over, such as banks and hospitals, or places where security is needed, a CCTV is generally installed. Its coverage is so restricted. In addition, our system is also very effective for other popular applications, such as analyzing traffic congestion by area, finding optimal driving routes, entry points, and evacuation exits during accidents, and planning the construction of new roads. Based on our findings, we offer a car spy camera system (integrated video-based car tracking system) that collects video and displays the user's real-time surroundings. In order to make the robot a surveillance rover vehicle, we recommend using the ESP32-CAM module to combine the camera with the rover. In addition to the ESP32 camera module, we will build this rover car using two DC motors, a rover chassis,
and an L293D motor driver module. To deliver both of these features, our systems are designed to efficiently handle traditional surveillance tasks that are often time-consuming and labor-intensive. One common approach for law enforcement to track the movement of a stolen vehicle is to begin by reviewing surveillance footage from CCTV and dash cameras in the surrounding area. then gradually expand to larger areas. Checking all relevant CCTV recordings and dashcams will be very labor-intensive and time-consuming. As for our system, based on the vehicle number, time, and location of the crime, we can easily formulate a query to determine the detailed trace of the stolen car. In addition, our system is also very effective for other popular applications, such as analyzing traffic congestion by area, finding optimal driving routes, entry points, and evacuation exits during accidents, and planning the construction of new roads. Based on our findings, we offer a car spy camera system (integrated video-based car tracking system) that can collect video and display the user's real-time surroundings. In order to make the rover a surveillance rover vehicle, we recommend using the ESP32-CAM module to combine the camera with the rover. In addition to the ESP32 camera module, we will use two DC motors, a rover chassis, and an L293D motor driver module to build th rover car

LITERATURE SURVEY

The V SHANKAR Intelligent combat robot of 2015 was developed as a remote-operated vehicle equipped with RF technology and a wireless camera for surveillance purposes. The wireless camera

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can transmit real-time footage, including night vision capabilities, over a wireless network. The robot has potential applications in warfare.

The robot's control system includes a Bluetooth communication IC that connects to the vehicle's motors and other components. When the accompanying android app is activated and connected via Bluetooth, wireless commands from the app control the robot. Bluetooth communication range is around 10 meters or 33 feet.

Dr. S. Bhargavi and S. Manjunath of Electronics and Communication conducted research to develop a combat robot that could reduce human casualties in terrorist attacks, like the September 11, 2001 attack. The robot is self-powered and radio-controlled, with controls similar to those of a typical car. It has a wireless camera for remote surveillance and can enter enemy territory invisibly, transmitting all information through its small camera eyes. The robot can be deployed in high-end hotels, shopping malls, jewelry showrooms, and other locations where intruders or terrorists may pose a threat.

Hebah H.O.Nasereddin and Amjad Abdullah Abdelkarim also used Bluetooth technology to control a robot using a smartphone. Their experiment proposed two modes of control: Direct Drive Mode (DDM) and Map Based Mode (MBM). In DDM, the robot moves in all directions as per the user's requirement. In MBM, the user draws the initial point, endpoint, and obstacle to calculate the shortest path. The wireless communication allows the user to control the robot in either mode.

II. METHODOLOGY WITH BLOCK DIAGRAM

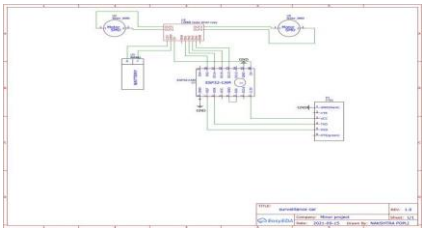
In order to develop a rover, a basic requirement is to have a structure or body to which its control circuits and actuators can be attached. Our main objective was to create a simple rover that can move forward, backward, left, and right by pressing a button.

The following components were used for this purpose:

- ESP32-CAM
- FTDI Programmer
- DC Motors (2)
- Motor Driver (L293D)
- Battery

Since the ESP32-CAM does not have a USB port, we needed an FTDI board to upload the code. The VCC and GND pins of the ESP32-CAM were connected to the VCC and GND pins of the FTDI board, respectively. The Tx and Rx pins of the ESP32-CAM were connected to the Rx and Tx pins of the FTDI board. The two DC motors were connected to the ESP32-CAM via the L293D module. The IO4, IO2, IO14, and IO15 pins of the ESP32-CAM were linked to the pins of the motor driver module.

The surveillance rover consists of an ESP32-CAM module with an ESP32-S processor, an OV2640 camera, and a microSD card slot. The camera can capture images that can be saved on the microSD card. In this case, the HTTP communication protocol will be used to receive video streaming from the OV2640 camera via a web browser. The web page will also have buttons to control the movement of the rover in the Forward, Reverse, Left, and Right directions. After uploading the code, GPIO 0 should be disconnected from GND. The Serial Monitor should be opened using a baud rate of 115200. The RST button on the ESP32-CAM onboard should be pressed to reset the module. The Serial Monitor should display the IP address of the ESP32-CAM. The FTDI programmer should be removed from the ESP32-CAM. The ESP32-CAM should be connected to the Pan/Tilt platform, and the power should be switched on. The RST button on the ESP32-CAM onboard should be pressed.



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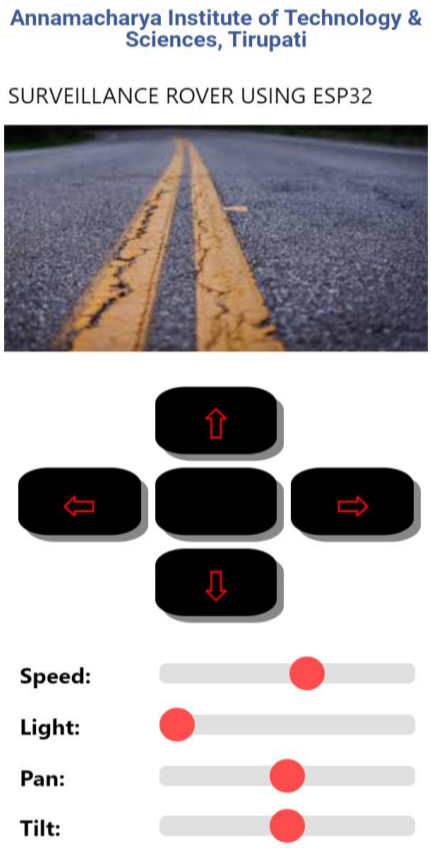

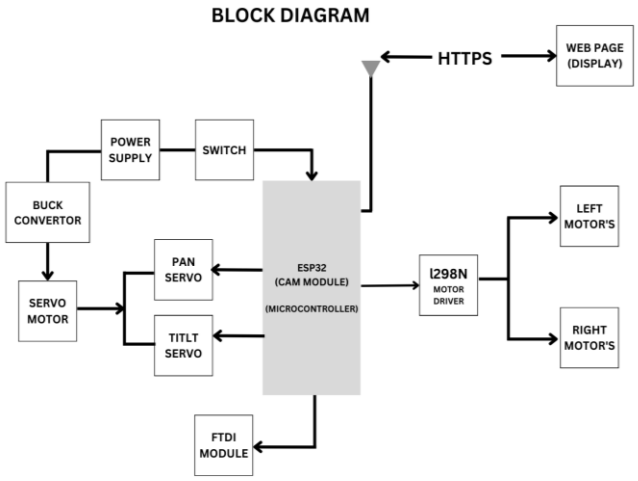

III.EXPECTED OUTCOMES

In various circumstances, such as mining mishaps or urban calamities, remotely controlled surveillance rovers are necessary to assess the damage and develop a strategy for accessing viable points and evacuation routes, which can save lives. To monitor sensitive areas of war zones or enemy territories, skilled workers are usually deployed to continuously observe changes, which carries the added risk of losing the workforce if they are caught by the enemy. However, recent technological advancements have made it possible to remotely monitor critical regions using rovers instead of humans. In some situations, areas may only require video surveillance for a short period of time, and installing fixed CCTV systems may not be practical, especially in agricultural settings. For instance, fields may only require video surveillance when crops are mature, and pastures need to be monitored

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when livestock are grazing. Moreover, the areas that are most suitable for surveillance, such as pastures, fields, and hills, often lack a power source. In such cases, mobile video surveillance using the Surveillance rover Car is a more practical and economical solution than fixed surveillance systems. Mobile rovers do not require expensive infrastructure, poles, or cables, which makes them more convenient and cost-effective for the agricultural sector.

A. APPLICATION WITH SCOPE

In today's world, technology is crucial in various situations, and rovers have become a necessity for the future. Ensuring virtual safety has become a mandatory requirement.

- **PATROLLING**

The streets need regular patrolling to ensure public safety and notify authorities promptly in case of any emergencies. The chances of receiving inaccurate or biased information are very low.

The surveillance bot can identify, collect, and quickly send information to the authorities if it matches any person's criminal history in the criminal database. For example, if a criminal is on the loose, the bot can send the police a message with the last known location of the criminal.

- **APPLICATION IN THE MILITARY**

Surveillance car rovers can be used in specific locations for information gathering and monitoring purposes. With advanced upgrades, these bots can provide instant data, which can be used to carry out military actions if necessary.

- **APPLICATIONS FOR TRAFFIC**

This technology can monitor compliance with traffic rules, including the use of helmets and seat belts while driving. In the current Covid-19 situation, people are required to wear masks and maintain social distancing.

- **CONCERNS ABOUT THE ENVIRONMENT**

To promote cleanliness, online fines are imposed for violating environmental standards. Short voice notes are played to remind individuals to follow the rules and keep the surroundings clean.

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