



# ADVANCE SURVEILLANCE ROBOT BY USING ESP32 CAM AND SENSORS

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**Abstract**—The technology behind this paper is developing a robot to perform surveillance tasks in domestic areas. Nowadays robots play a significant role in our present-day life thus reducing human effort and human error. [5] The robots will be manually controlled. In this project, the robot can be operated with the help of mobile via internet and live streaming of video can be simultaneously received during. Also during night time with the help of wireless camera on the robot. The mechanism will be controlled manually with ESP32 CAM. This robot uses a motor driver for a controller that controls the mechanism.

## I. FOREWORD

Surveillance is the process of observing a situation, area or person. This usually occurs in a context where countries are concerned with military border surveillance and homeland security. This is achieved by assigning human supervision close to sensitive areas of personnel to continuously monitor changes. But humans have limitations and limitations. [1]

Places that are not always possible. There are also additional risks of losing personnel in case of capture by the enemy. With the advancement of technology, it is possible for robots to monitor remote areas of importance using humans. By providing the high resolution cameras and various sensors, it is possible to obtain distance information to specific area. Besides the obvious advantage of not endangering any personnel, land and air robots can also see details invisible to humans. By providing high resolution cameras and various sensors. It is possible to get distance information for a specific area. In such systems, disposal technicians and mission controllers have various challenges, including high there are dangers in that. [2]

A typical mine disposal operation initially involves surveying the site using a remote controlled surveillance robot and mine disposal. The device also incorporates a capable camera not just watching but also recording. [6] An Android smart phone works as a remote for the movement of a robot. Android application will be developed for this. The

The ESP32-CAM module acts as an interface between the smartphone and the Arduino. ESP32-CAM module gives commands to the controller from the smart phone. Acts as a regulatory brain robot. [3]

The controller determines the movement of the surveillance robot. The controller will can be programmed with the help of Embedded C programming. In addition to the present, we also have Ultrasonic sensor and bomb detection detector. [7]

## II. OBJECTIVES

A surveillance robot can be controlled using an accelerometer. Live view or live videos can be enabled to view and control the surveillance robot on the iPad or mobile screen. With gas sensor module design adds surveillance robot by detecting harmful gases and LPG leakage in your home and land. The MQ2 sensor can detect gas concentrations from 200 to 10,000 parts per million (ppm).

Attaching metal detectors. It is used to sense the spiral arm inland. Move with Receive Info. This robots can be used for security purposes where we need to get information about some suspicious area/people. We can do this by sitting at a far secure place and safely devise a plan to tackle their activities.

## III. PROBLEM STATEMENT

Technology is reaching its pinnacle in providing comfortable lifestyle and human limitations are nowhere to be reached. Earlier the robots were controlled through wired networks but now to make the robot more user-friendly, they frame it to perform the work ordered by the user. The robot's ability to work anywhere it has a wireless connection. This scheme can be used for security purposes to get information about some suspicious area/people. [4]



IV. METHODOLOGY

Software Development:

The Arduino Integrated Programming Environment (IDE) is a cross-platform framework (for Windows, MacOS, Linux) written in Arduino IDE code and HTML/CSS functions.

Platform Development:

For the camera, we have used an ESP-32 camera module which is equipped with camera and wi-fi module. To program the ESP-32 camera module we have used one FTDI programmer.

MQ-02 gas sensor is one of the important sensors in the field as it allows one to detect or measure various gases like LPG gases and smoke

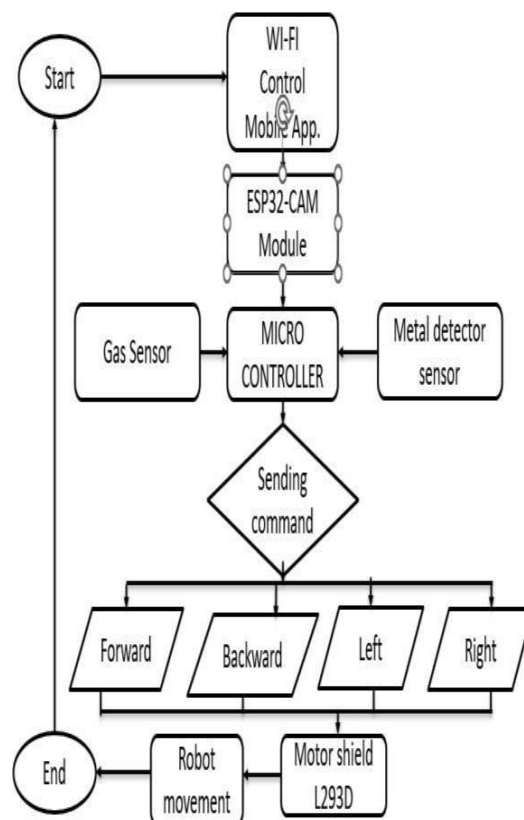


Figure 4.1 Flowchart

Establish the ESP32-CAM WI-FI connection between the Android app and the WI-FI module on the surveillance robot. Check if the device is connected. If connected, issue pre-defined instructions/commands to the user of the mobile.

Commands should be trained to the easy WI-FI module. Then the stored commands are represented in the form of binary numbers, for example move forward -001, move backward - 010 etc.

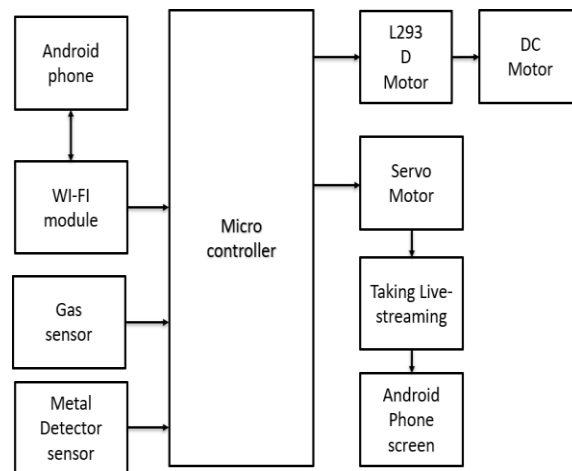


Fig 4.1: Block Diagram

Figure 4.2 Block Diagram

These binary values are transmitted through the ESP32- CAM module which is the transceiver. The microcontroller takes those binary values and executes the action (servo motors) to rotate 360 degrees. Type binary values and capture video livestreaming.

The design of this project, structural modular design concept is adopted and the system is mainly composed of Renesas Microcontroller, GSM module. The CNN algorithm is implemented on a laptop. The user has to load the brain MRI image dataset on the laptop. The system pre-processes and extracts the features and trains the model using CNN algorithm. During the testing phase, the user passes a brain MRI image as input, our system detects brain tumors or not, and transmits the information.[8]

## V. HARDWARE AND SOFTWARE REQUIREMENTS Software Requirements.

- Arduino Ide

### Hardware Requirements.

- ESP32-CAM Board
- FTDI programmer
- DC Motors
- 4 pair of wheel
- Robot chassis
- L293D Motor Driving Module
- MQ-06 Gas Sensor
- Metal Detector sensor
- Servomotor
- LEDs and Buzzer
- Jumper wires
- Battery



## VI. RESULTS

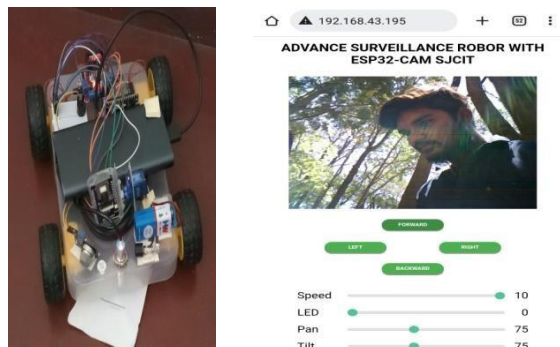


Figure 6.1 Results

The progress of our model is shown in above.

It consist of ESP32-CAM is a given data Wi-Fi module from user's android phone. The motors are driven L293D motor driver.

Gas sensor and metal detector sensor is trigger the buzzer and LED when it contact with in the range gas smell and metal plate pieces.

## VII. ADVANTAGES

- It is easy to use
- It reduces human risk
- It is very reliable
- Surveillance robots are small in size, so space is required.
- Very easy installation surveillance feature everywhere
- Reduced worker exposure risk.

## VIII. APPLICATIONS

- It reduces the stress on the military units during times of disaster.
- This project can help a community which has suffered a disaster to recover easily within a short span of time. Remote areas can also be explored.
- Certain places are only for gathering information and monitoring; thus, this surveillance bot can surely be used.
- It can be used to monitor traffic rules, persons wearing helmets or not, and car seat-belts.
- By combining camera features with the robot, we can easily monitor indoor as well as outdoor locations during daytime and at night.

## IX. CONCLUSION

Portable wireless surveillance robot built for military, and police security purposes. The surveillance robot incorporated with the gas sensor module is designed to detect the leakage of harmful gases and LPG in the industry and in the terrains where the gas pipeline is installed. Consequently, we can assume that our system is capable of achieving To overcome all the above mentioned goals and existing ones Challenges of the system. With our proposed system, surveillance is Much improved. The designed system enabled us to achieve this The following goals: real-time monitoring, less human interference, and the use of active sensors in the field.

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