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Long Range Spy Robot Using Internet of Things

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Abstract: ***A robot is usually an electro-mechanical machine that guided by computer and electronic programming. Many robots have been built for manufacturing purpose and can be found in factories around the world. Now a days many illegal activities like crossing borders through forest regions, planting landmines, etc to keep an eye on such activities there is a need for some spying device that can spy on the restricted areas or some forest or territorial region where a human cannot go due to risk. Designing of the latest robot which can be controlling using an android mobile In developing the remote buttons in the android app can be control the robot motion.***

The proposed project Long Range Spy Robot using internet of things allows operating a robot irrespective of the distance of the person operating it. This robot is capable of capturing the video and move according to the commands given by operator. The live video can be seen on any device mobile or laptop remotely.For this project we used IoT technology which make use of internet. The robot is controlled by mobile phone installed with blynk app using esp8266 Wi-Fi module. Live video is seen using Esp32 cam module on any device with IP address of esp32 module. This Robot has its own Wi-Fi dongle which uses 4G network, ESP8266 and ESP32 cam module connect to this network. So this robot is enabled with own 4G internet can be controlled anywhere in the world for a truly long distance.

Keywords: Internet of Things, ESP8266, ESP32, Blynk App, Wi-Fi dongle etc.

I. INTRODUCTION

Now-a-days better surveillance is required for security purpose for spying purpose and in defense purpose. Our project Long Range Spy Robot using Internet Of Things has designed by considering problems with the latest surveillance technology. This project is basically a robot which is connected to the internet. Uses its own Wi-Fi dongle network so possible to control this robot from anywhere in the world and has no limit in the range only network coverage is the limit.

This robot has wheels for moving in desired direction.

Which has an excellent feature live video streaming from the location of robot. For this we are using ESP 32 cam module. This camera captures the live video on the robot location and we can watch the live video remotely from anywhere in the world.

With the help of video of that location user who is controlling the robot can easily find the obstacles in the path and control the robot easily.

Blynk is a mobile app which is used to control the robot remotely. For controlling purpose, we have used ESP 8266 wifi module which connect the robot to the internet.

Any obstacles in the way can be known to the user and from the remote location the person can control the robot and spy.

II. EXISTING METHODOLOGY

At present, we have static surveillance systems which is stationary. If we want to monitor something beyond the camera area, we cannot do it. And the captured video is also recorded which is stored in a computer hard disc.

Which may get deleted by theft or intruder. And this Recorded video only stored in that particular location and user cannot access this remotely. This is the drawback of this system.

Our proposed system supports dynamic surveillance system.

Here the surveillance system is robot which is connected to internet which moves in desired direction and captures the video.

The user controlling the system can watch live video based on the video reference the user can control the robot.

This recorded video is accessed by the user remotely from anywhere in the world.

III. HARDWARE AND SOFTWARE REQUIREMENTS

A. Hardware Components

1) NodeMCU ESP8266 module
2) ESP32 CAM module
3) L293D motor driver
4) Servo motor
5) Wi-Fi dongle
6) Motors
7) IC Regulator 7805 5V
8) Battery 7.5 V
9) Wheels
10) Chassis wood
11) Jumper wires

B. Software Components

1) Arduino IDE platform.
2) Blynk App

IV. BLOCK DIAGRAM & CIRCUIT DIAGRAM

A. Block Diagram

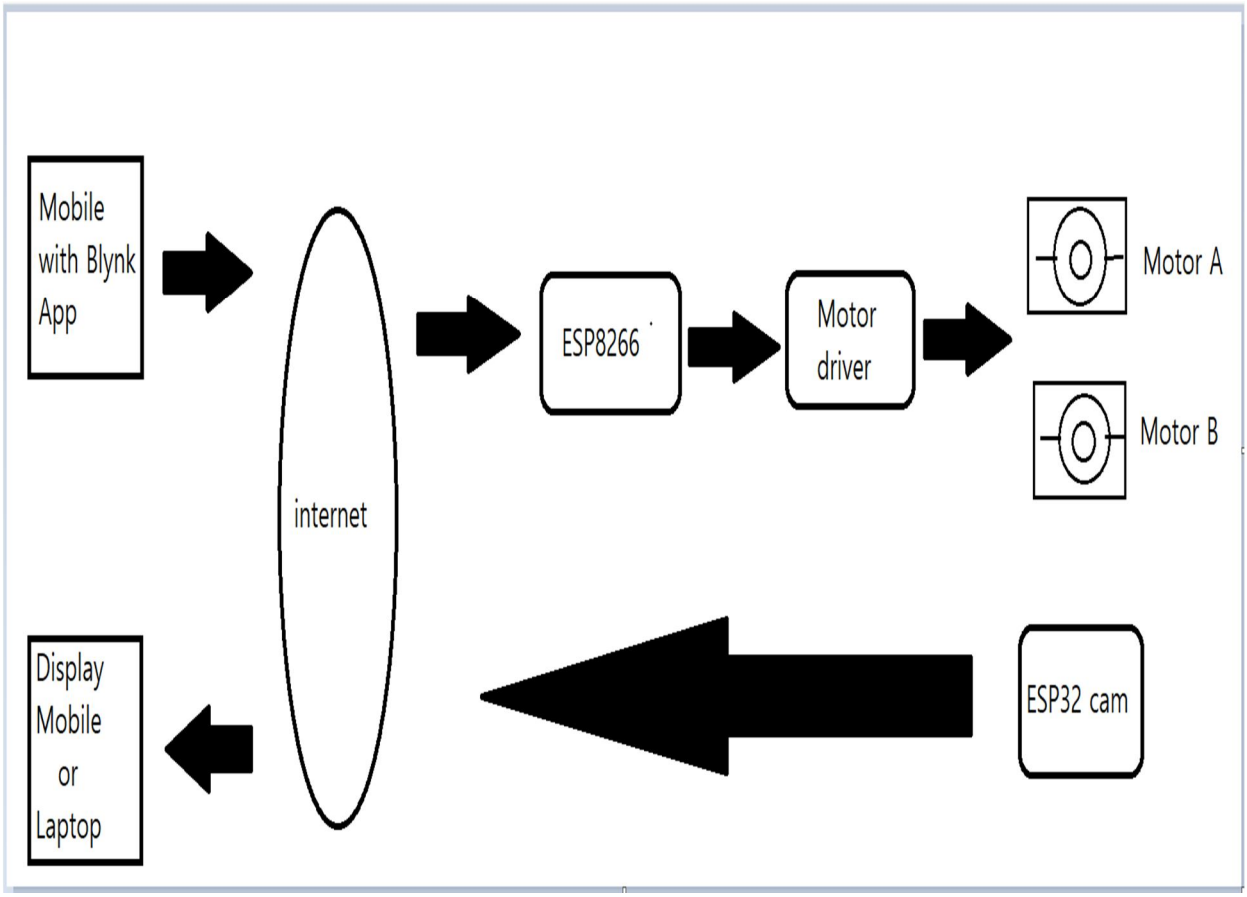

Fig. 1: Block Diagram

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B. Circuit Diagram

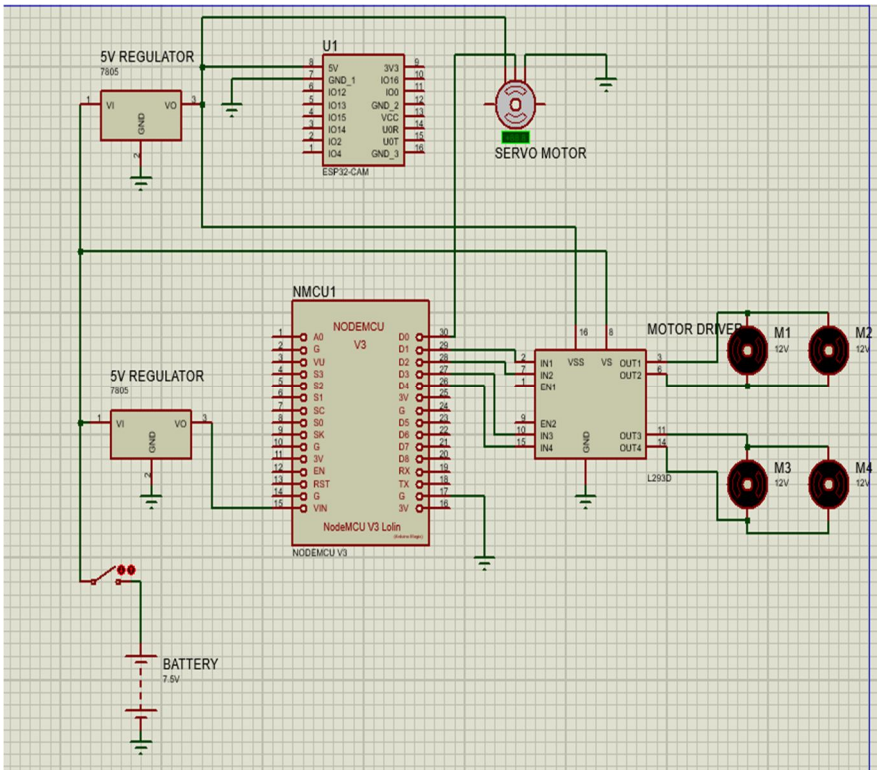

Fig. 2: Circuit Diagram

V. PROPOSED METHODOLOGY

Our proposed system supports dynamic surveillance system. Here the surveillance system is robot which is connected to internet which moves in desired direction and captures the video.

The user controlling the system can watch live video based on the video reference the user can control the robot.

This recorded video is accessed by the user remotely from anywhere in the world.

At first, we need to create project in Blynk app. The necessary controls like Joysticks, switches, sliders etc. After creating the project with controls, we need to save the project. A auth code will be generated and that is received through registered email id.

This auth code different for different projects and this auth code is used while programming the esp8266 module to connect robot with the Blynk app.

After completing the blynk app set up we need to define the auth code in the program so that the robot connects to the blynk app.

Along with the auth code we also need to mention the Wi-Fi credentials like host name and password. Here we are using Airtel Wi-Fi dongle we have used this dongle Wi-Fi credentials.

We have used ESP 32 cam module for video capturing and live streaming. This module has inbuilt camera which support 5 mega pixels. It has inbuilt Wi-Fi module and controller after programming this module we will get a google link. This link will open the web video streaming using this we can open the live video on any device.

When we press the controls in the blynk app it will send some commands to the esp8266 Wi-Fi module, then Wi-Fi module will trigger the atmege 328 microcontroller which is embedded in the module. After this microcontroller will send some commands signal to the motor drivers connected to the controller. According to the commands these motors will rotate in a desired direction. And there is a servo motor where camera module is mounted on which helps to rotate the camera in 180 degrees.

In blynk app we use switches to rotate the camera in 0, 90, 180 degrees. Along with this slider is used to rotate the cam module in specific angle other than these 3 angles. With this we can capture video in all directions.

This is powered by lithium-ion battery 7.4 volts and each module uses its own voltage rating for that we have used separate ic regulators for each unit.

Through this we are able to control the robot remotely and can live stream video and watch from anywhere in the world.

VI. WORKING PRINCIPLE

A. *Power supply :* In the circuit we used 7.5V battery two Lithium-ion batteries in series each of 3.7V. The ESP8266 and ESP32 cam modules use 5V power supply and Motor driver uses more than 5V. So we have used 7805 IC Regulator which takes 7.5V as input and convert it in to 5V Regulated power supply. Motor driver is directly connected to Battery.

B. *Geared DC Motors:* In this robot, four 12V DC motors are used each uses minimum of 250mA current. These motors are geared and available with different torque and RPM, which allow robot to move in desired direction based on commands signal from user.

C. *ESP8266 NodeMcu:* It is a heart of our project, this module consists of inbuilt Wi-Fi module and microcontroller unit. We have programmed it using Arduino IDE software in such a way that when we send command signal from mobile phone app (Blynk app). This module will receive the commands through internet network and send active signal to motor driver, and motor driver control the rotation of motors in desired direction.

D. *ESP32 CAM:* This module is same as ESP8266 except it has an extra feature camera. It has inbuilt camera which supports live web video streaming. After programming this module, we get the link IP address in serial monitor of Arduino IDE software.

E. *Blynk App:*Blynk app is a IoT based app. Robot controlling is done using this app. At first, we need to create the project in blynk app then we must select the esp8266 device. Then after we need to set up the controlling like joysticks and switches in the project created. This controlling panels ask for theI/O pins of ESP8266 we are using, then we must select any io pins we wish to use in the project. We have used five I/O pins, four or motors and one for controlling servo motor.

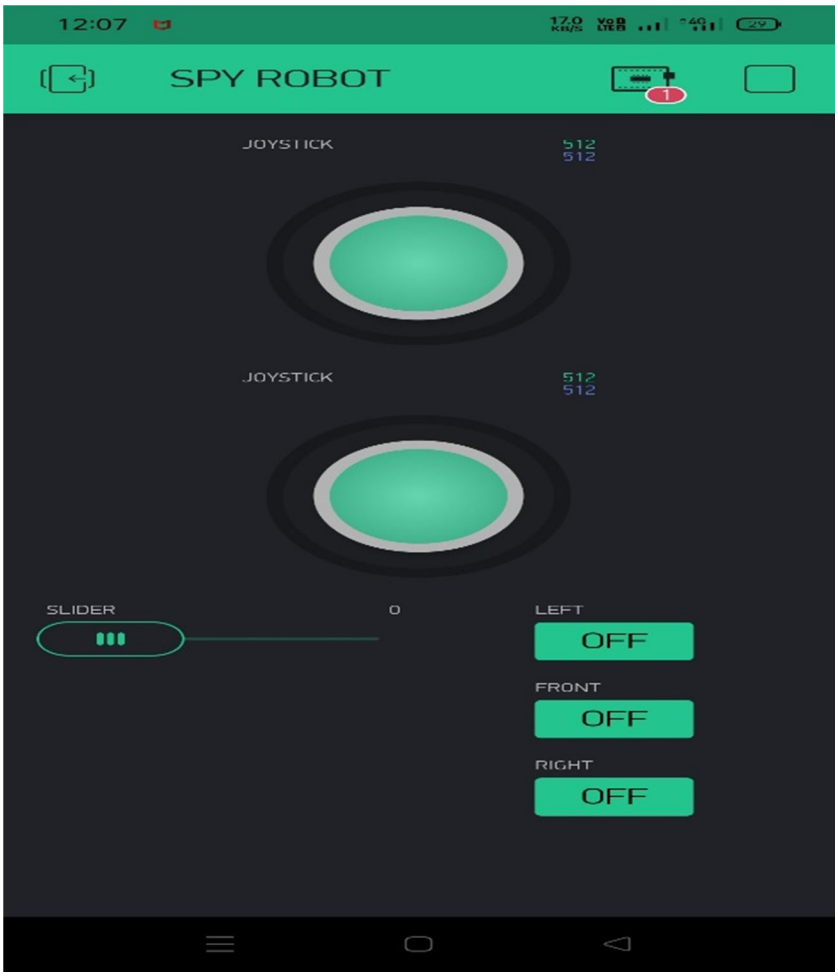

Fig. 3: Blynk app control panel

We have created the project “SPY ROBOT” in the blynk app and added all the control panel in the project.

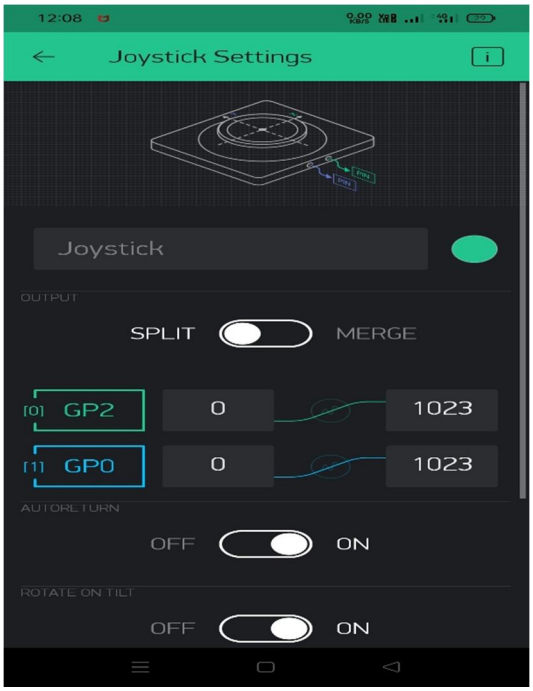

Fig. 4: Joystick setting

Joystick uses two I/O pins, we have used GP2 and GP0 for controlling two left side motors. With this joystick we can control the direction of rotation of left side two motors. Initially the logic of GP2 is set to 0 and GP0 is set to 1 so that moving joystick cause change the logic makes change the direction of motors.

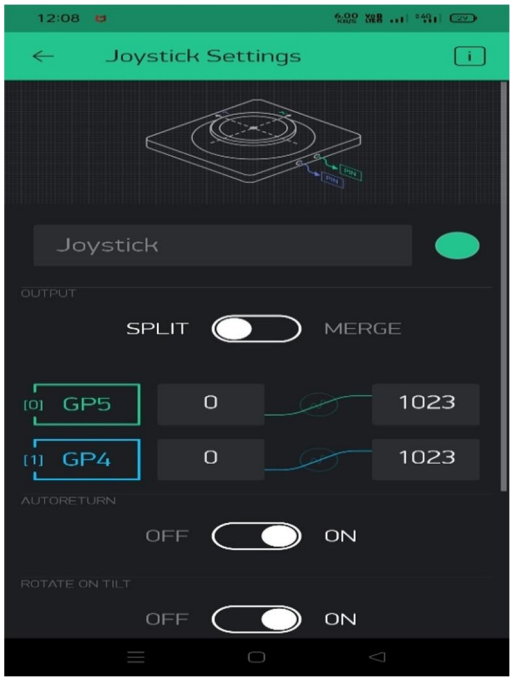

Fig. 5: Joystick setting

This joystick also uses two I/O pins GP5 and GP4 for the control of right side two motors.

F. Servo Motor: Servo motor is a type of motor which supports rotation in accurate angle. The camera must be rotated in around 180 degrees in order to have a complete vision across all directions, so we mounted cam module on this servo motor, which rotates in 180 degrees in any direction we want.

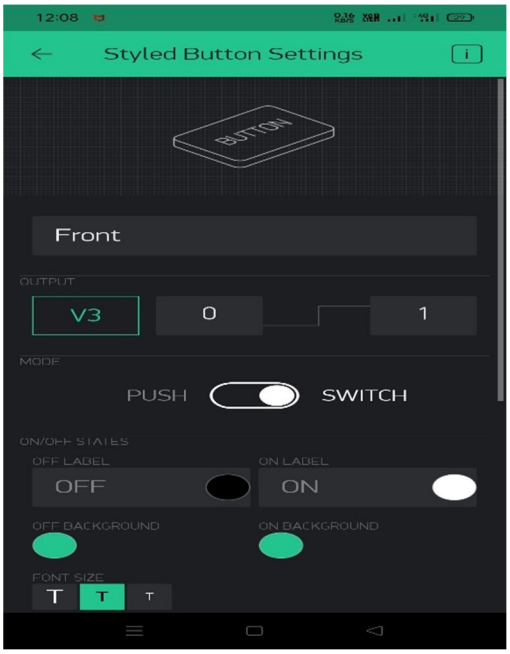

Fig. 6: Servo motor setting

Fig. 6: Here we used styled button and named it as front, basically this is a virtual pin which is not physically exist, Due to shortage of I/O pins of esp8266 we have used virtual pins, only with one physical pin we can create many numbers of virtual pins. Here each virtual pin used for each direction, for front direction we have used V3 virtual pin. This is the best feature of blynk app. When we press this button the servo motor comes to 90 degrees so that we can capture front view.

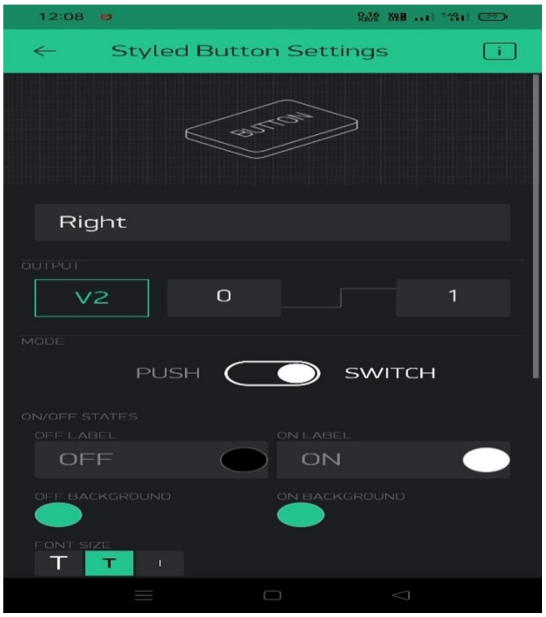

Fig. 7: Servo motor setting

Fig 7 This button is to rotate the servo motor in 180 degrees so we can capture video in right side view.

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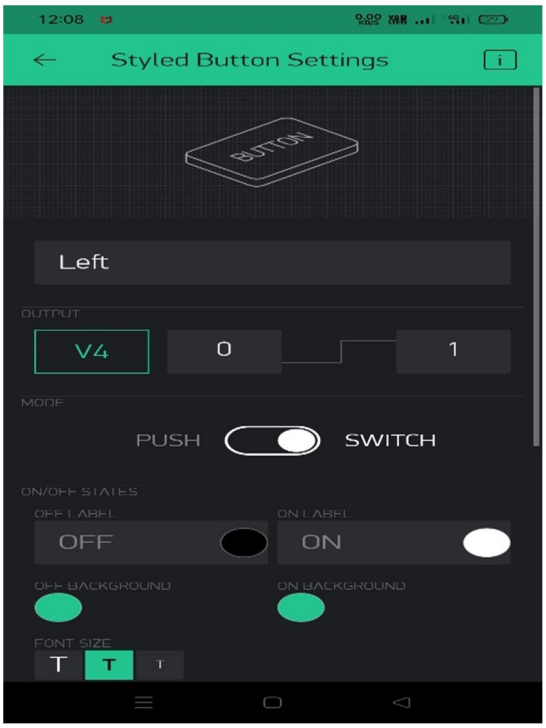

Fig. 8: Servo motor setting

Fig 8 This button is to rotate the servo motor in 0 degrees so we can capture video in left side view.

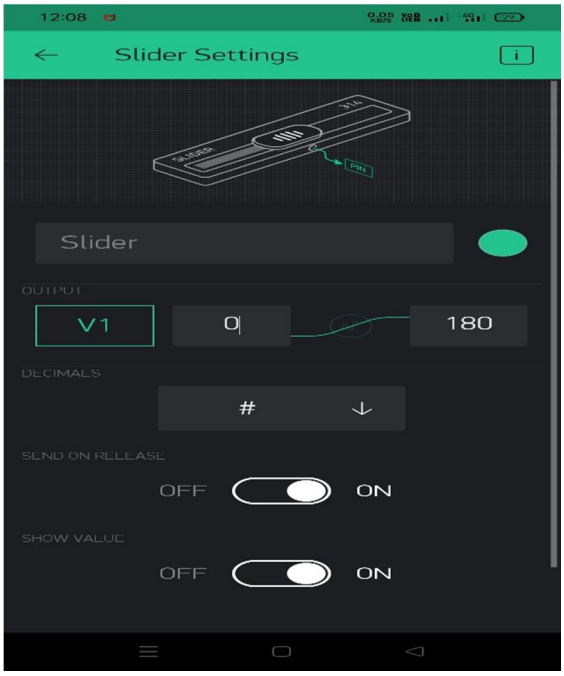

Fig. 9: Slider setting

Fig 9 Slider is control panel which is used to rotate the servo in user defined angle. With the buttons we can only rotate in front, left and right sides but we cannot rotate in other than those directions.
With the slider it is possible to rotate servo mounted with camera in any angle within 0 to 180 degrees. And it is using virtual pin V1.

VII. ADVANTAGES

1) This spy robot is helps to observe the behavior of wild animals where human beings cannot reach.
2) Helps in army applications to detect the bombs.
3) Video surveillance is dynamic
4) Cost efficient
5) IoT enabled Video surveillance
6) Hostage Rescue
7) High-Risk Warrant Service
8) Inspection of Ventilation Ducts.
9) Inspection of Contaminated/Hazardous Environments

VIII. DISADVANTAGES

1) Signal jamming
2) Power dependency
3) Privacy and cost
4) Privacy issues and crime
5) Lack of local knowledge

IX. APPLICATIONS

1) This Robot is used to monitor behaviors of animals in forest where human beings cannot enter.
2) Used in army applications to monitor activities of neighbor countries and to detect the bombs.
3) Used in industries
4) Hostage Rescue
5) High-Risk Warrant Service
6) Inspection of Ventilation Ducts.
7) Inspection of Contaminated/Hazardous Environments

X. RESULTS & DISCUSSION

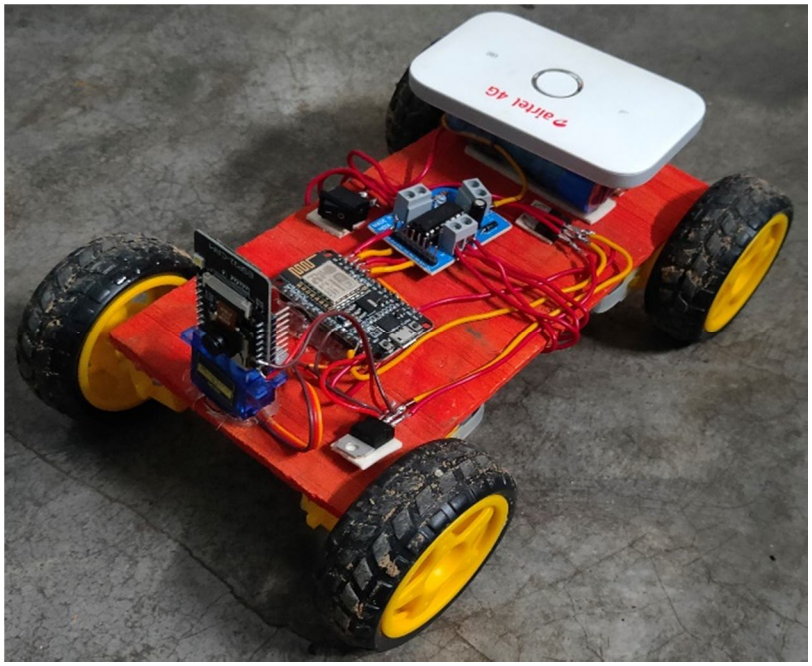

Fig. 10: Final output

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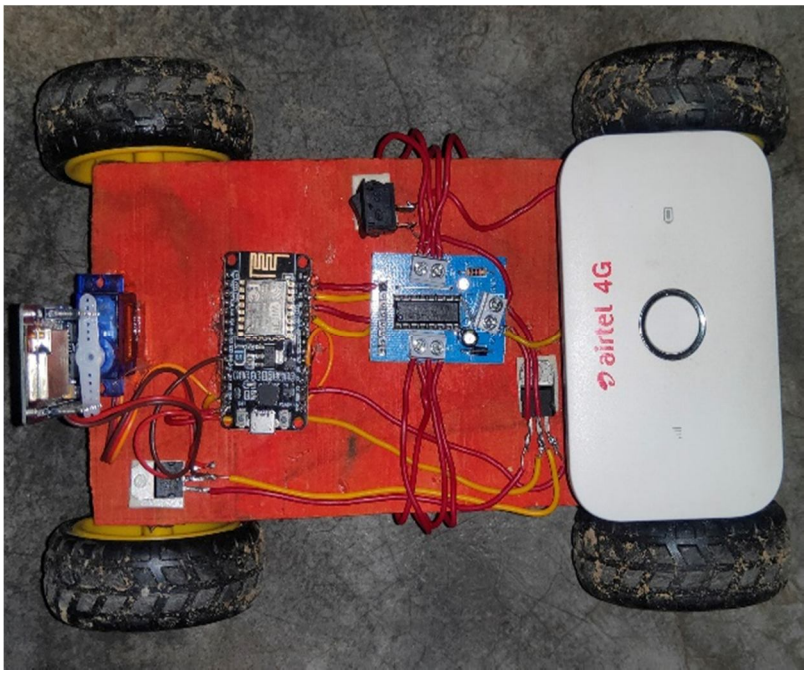

Fig. 11: Final output

XI. CONCLUSIONS

The Spy Robots are "throw able" robots, which serve as your "man on the inside" for a broad range of military, police, security, and rescue applications.

In any dangerous, hostile, or confined environment, you'll instantly get critical visual intelligence that can save lives and reduce property damage.

The model of robot can be described to build a robot using wireless camera run by android application and the people can learn about developing android application in order to control the robot through wireless application using the platform of Blynk app.

The robot can be made more enhanced by adding features like gas sensors with night vision camera.

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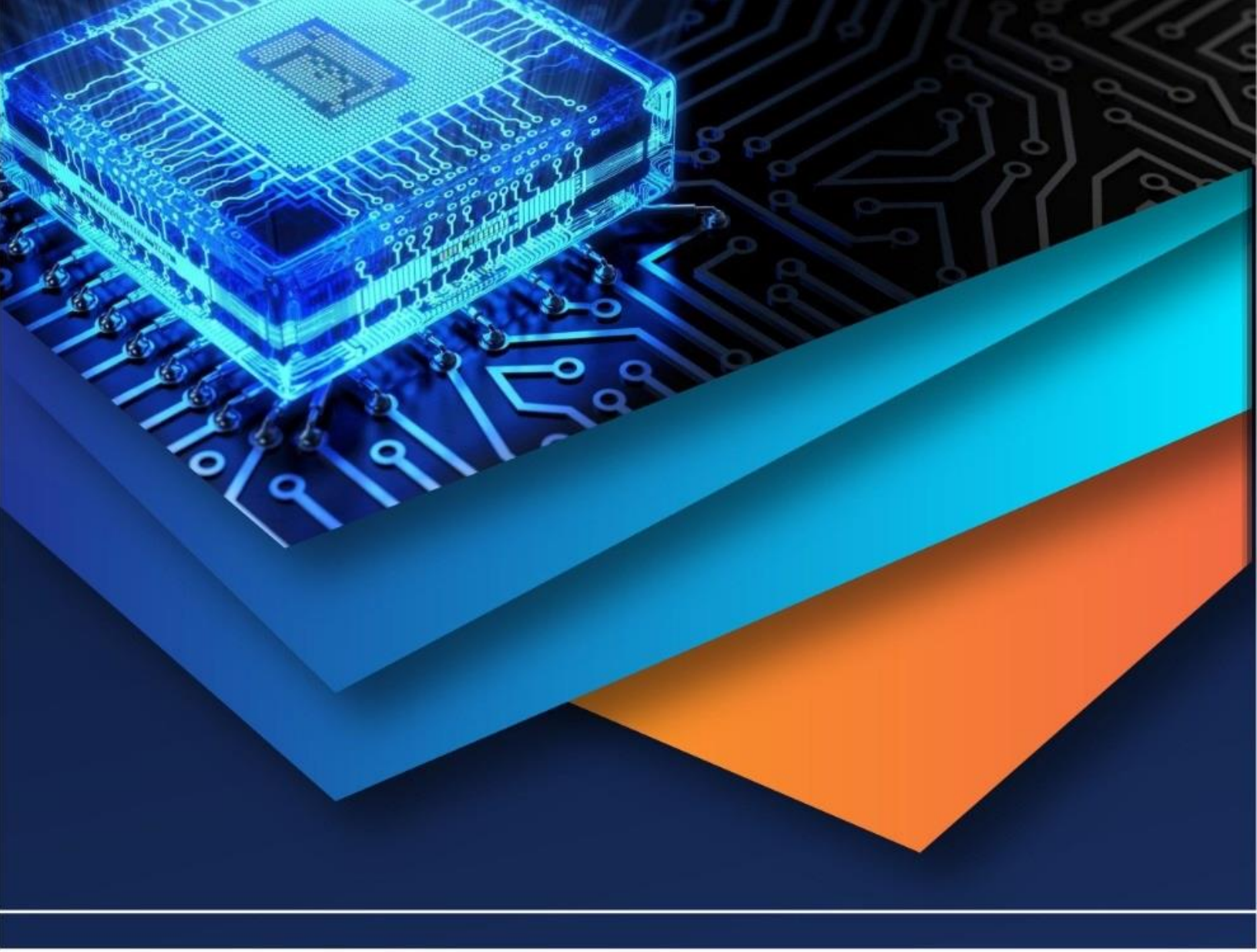

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