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Wireless Night Vision Camera on War Spying Robot

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Abstract

The primary goal of building this robot is to monitor human actions in the battlefield or border zones in order to limit enemy infiltration. The robot is equipped with a night vision wireless camera that may broadcast footage of the battlefield in order to avoid any harm or loss of human life. The major goal and purpose of this project is to address security challenges such as preventing terrorist operations by tracking their whereabouts and launch pads and decreasing troop effort and engagement in the mission. This robot is capable of carrying out all types of military operations under all situations with little input from soldiers, saving lives and neutralizing terrorist activity. This may also be beneficial in acquiring information on the rivals' weapons and ammo, as well as destroying them from a safe distance. This gadget, which serves as a guiding machine, is simply linked to the rocket launcher and tanks. Not just in the defense industry, but also in disaster management, might be beneficial in dealing with emergencies such as floods and earthquakes. This can be simply controlled by Bluetooth or Wi-Fi. However, we are more worried and focused on Wi-Fi in our project because it has superior communication characteristics and range. The test findings reveal that the developed system can return live video and accurately regulate the robot's movement.

Keywords : *Android, Robot, Node MCU ESP8266, Night Vision Camera, L293D, Mi Camera, Wifi-module.*

I. INTRODUCTION

The advancement of technology has resulted in a major shift in the field of robotics and automation, which affects everything from family domestic work to the defense industry. Today, smart phones have revolutionized the worldwide market by changing people's lifestyles and giving multiple apps on various operating systems [21]. The Android operating system is one of these open source platforms that has had a significant effect by giving various applications for robots to assist people in their daily lives [22]. A web-based mobile robot control system has several applications in a variety of sectors. With the advancement of space technology, maritime technology, and atomic energy technology, such as space exploration and research, there is an urgent need for a large number of advanced robots working in hazardous situations [23]. However, because of sensors, controllers, and other factors, it is difficult to design a robot that can be totally self-contained

in an unstructured environment for an extended length of time. As a result, developing a mobile robot remote control system based on a computer network is a viable option. It may also pave the way for the advancement of robot technology [24].

A robot is a piece of hardware designed to do numerous activities while reducing human effort. Software and hardware combine to form the equipment known as a robot. Robotic technology is the way of the future for deploying dangerous and life-threatening activities [4]. Because human life is valuable and people cannot reach everywhere, robots are needed to assist humans in overcoming their limits. Because robots produce reliable findings, this has resulted in significant advancements in the robot business [5]. Robots are extremely useful in dangerous environments when people are unable to access areas rife with foes and hazards. The Android operating system is extremely useful for simply operating robotic systems via smart phones [1].

The incorporation of Wi-Fi is a significant improvement in the design of this robot [6]. We can also use Bluetooth [8] instead of Wi-Fi [9], although Bluetooth has a shorter range of connection to make the robot perform more effectively than a Wi-Fi-based system [5-6]. Wi-Fi is also handy when we are extremely far away from the device, but our connection and Wi-Fi network are good, so it functions more effectively [6]. The Node MCU ESP8266 in this case serves as a bridge between the camera and the motor driver module mounted on the robot. It comprises of a motor driver module that functions as a controller to regulate the motion of the robot in order for the wheels of the robot attached to it to work [7]. The motor module utilized is called L293D, and a connection connects the Node MCU module to the motor driver module. This connector will be used to provide external power source. There are four wheels that run on direct current. The motor drives the robot's movement [5]. The camera employed here can spin 360 degrees to capture everything from every angle wherever we want to figure out the scenario at the location where it is utilized for spying.

II. BLOCK DIAGRAM & OPERATION

This project is primarily intended for espionage purposes and will be managed via a mobile app. A camera is installed in this spying robot so that it may record things such as movies or footages and transfer them to the spying army maintaining a hidden watch in the suspected location or person. The robot is created in a microscopic size so that it may be hidden from the suspect and can even access regions where individuals cannot go to investigate whether anything suspicious has occurred. Our goal is simply to get this robot moving so that it can be controlled by a mobile app named "WIFI ROBOT VOICE CTRL APP." The robot must be handled cautiously and covertly so that it is not discovered by any suspicious individual. It features a camera, which is controlled by the battery and applications. With the aid of the Wi-Fi module [9], we are controlling the entire robot with two applications. It will assist us in recording any movies and information on everything we wish to acquire and displaying it on our mobile device. When we wish to record something in the dark, we utilize an LED light in the camera. The Node MCU module, ESP8266, is utilized in it for signal transmission and reception from the app to the robot so that we may tackle and control the robot's motion. To control the robot's movement, we use two apps: the "V380" app and the "WIFI ROBOT VOICE CTRL" app.

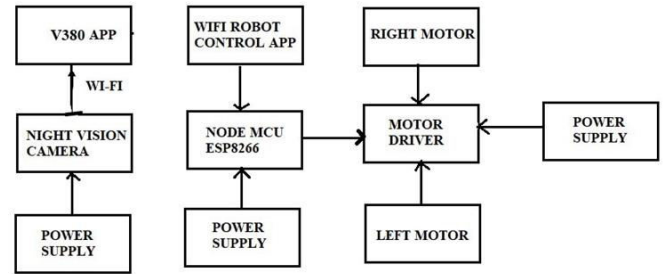


Figure 1. Block Diagram

III. HARDWARE AND SOFTWARE REQUIREMENTS

3.1 Node MCU ESP8266

The NodeMCU ESP8266 development board includes the ESP-12E module, which contains the ESP8266 chip, which is powered by a TensilicaXtensa 32-bit LX106 RISC CPU. This microprocessor supports RTOS and works at a configurable clock frequency of 80MHz to 160MHz [13]. To store data and applications, NodeMCU features 128 KB of RAM and 4MB of Flash memory [14]. Its high processing power, along with built-in Wi-Fi/Bluetooth and Deep Sleep Operating capabilities, makes it suitable for IoT[10,11] projects. The NodeMCU is fueled through a Micro USB connector and a VIN pin (External Supply Pin). It has interfaces for UART, SPI, and I2C.

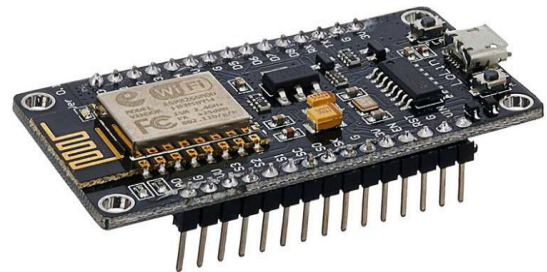


Figure 3. NODE MCU ESP8266

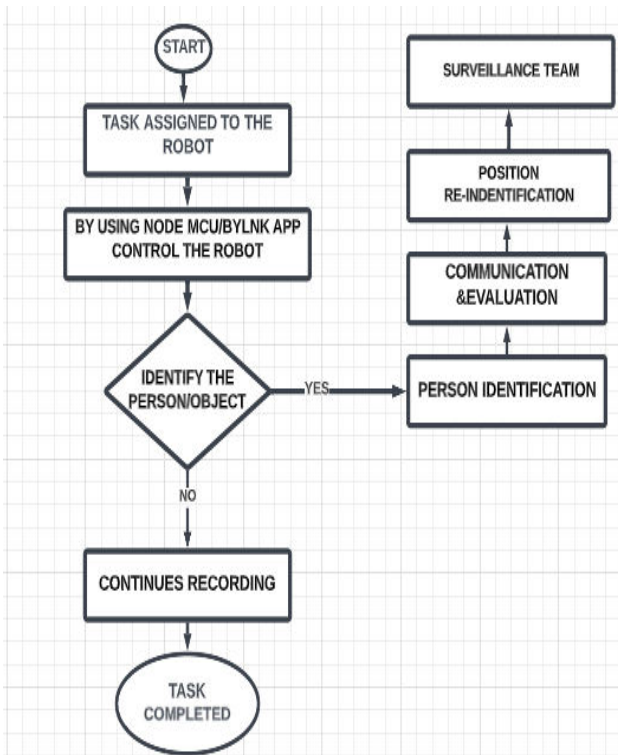


Figure 2. Flowchart

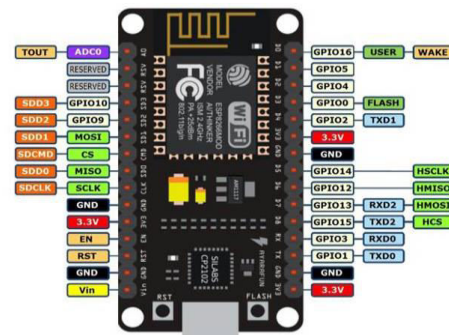


Figure 4 . ESP8266 Pin Configuration

3.2 L293D Motor Driver

The L293D driver is the most widely utilized in bidirectional motor driving applications. The L293D is a 16-

pin motor driver IC used to power the motors. The L293D is a dual H-bridge motor controller. It may drive direct current in either direction [15]. L293D can operate two DC motors in each direction at the same time. It is utilized as a current amplifier because it accepts a low current control signal as input and outputs a high current signal [16]. L293D may be used to power both tiny and large motors. The L293D motor driver is offered for enabling user-friendly interface for embedded applications [17]. It is simple to integrate into any of the systems.

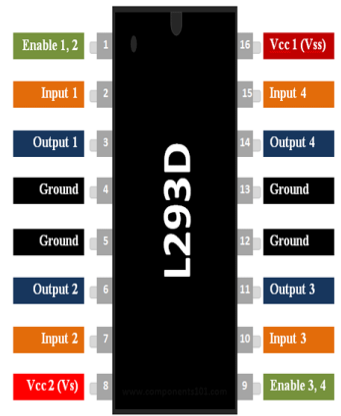


Figure 5. Pin Configuration of L293D

3.3 Night Vision Camera

A wireless CCD camera, which is widely accessible on the market, is employed here. This camera is powered by a 12 volt DC source [18]. The camera is equipped with a receiver, which is located at the remote station. Its output is in the form of audio and visual signals, which are transferred straight to a television or computer through a tuner card. The CCD camera is mounted to the robot. The camera records audio and video signals and delivers them to the remote station, where we may see the collected signals using the camera receiver, which is linked to a television or a computer [18]. This is a compact wireless monitoring video camera and wireless receiver combo for home and small business surveillance and security that we use for demonstrations [19]. Install the wireless camera in the room we want to monitor and place the wireless receiver in the next room (up to 15 meters away) and connect it to a TV or DVR to observe or record the action for security purposes. This wireless camera is being installed in a combat robot that will be present on the battlefield [20].



Figure 6. Wireless Night vision camera

3.4 V380 APP

V380 is a new generation of intelligent household cloud camera free application that allows for simple remote video monitoring and administration. This programme allows you to see the real-time video process at any time and from any location. Turn on the camera and switch it to hotspot mode. When the (MV+ID) hotspot signal is discovered in the mobile phone's WiFi list, it indicates that the device is in the waiting configuration state [21].

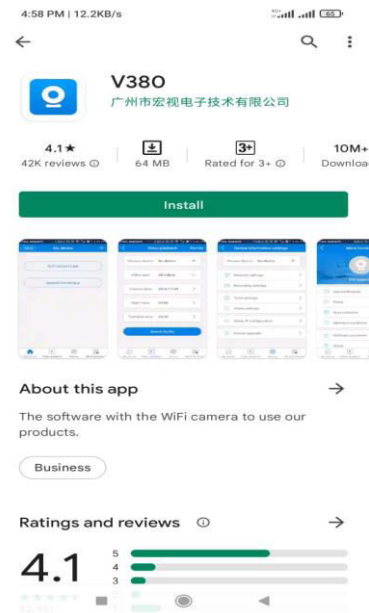


Figure 7. V380 app

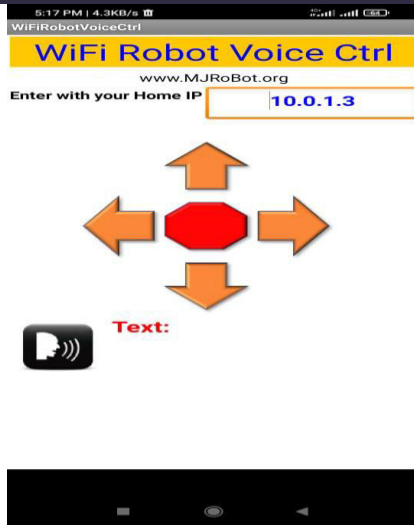


Figure 8. WiFi robot voice ctrl app

IV. IMPLEMENTATION AND RESULTS

This paper [22] is primarily intended for espionage purposes and will be managed via a mobile app. A camera is installed in this spying robot so that it may record things such as movies or footages and transfer them to the spying army maintaining a hidden watch in the suspected location or person [23]. The robot is created in a microscopic size so that it may be hidden from the suspect and can even access regions where individuals cannot go to investigate whether anything suspicious has occurred. Our goal is to simply move this robot, which will be controlled by a Smartphone app named "Wifi robot voice control app." The robot must be handled cautiously and covertly so that it is not discovered by any suspicious individual [25]. It features a camera, which is controlled by the battery and applications. With the aid of the Wi-Fi module, we are controlling the entire robot with two applications [26]. It will assist us in recording any movies and information on everything we wish to acquire and displaying it on our mobile device. When we wish to record something in the dark, we utilize an LED light in the camera. The Node MCU module, ESP8266, is utilized in it for signal transmission and reception from the app to the robot so that we may tackle and control the robot's motion.

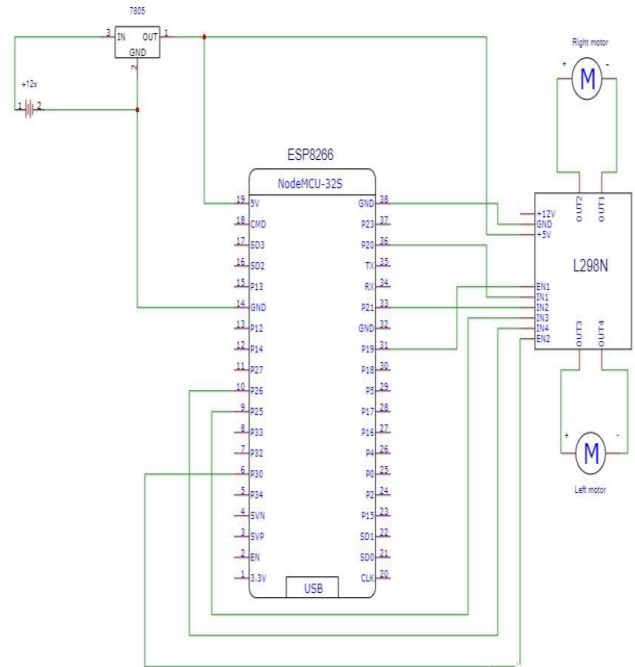


Figure 9. Schematic diagram



Figure 10 a. Project Kit

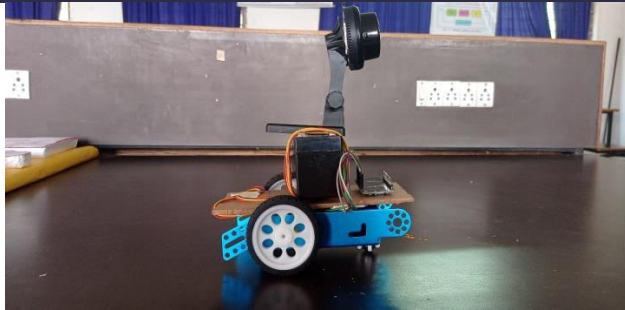


Figure 10 b. Project Kit

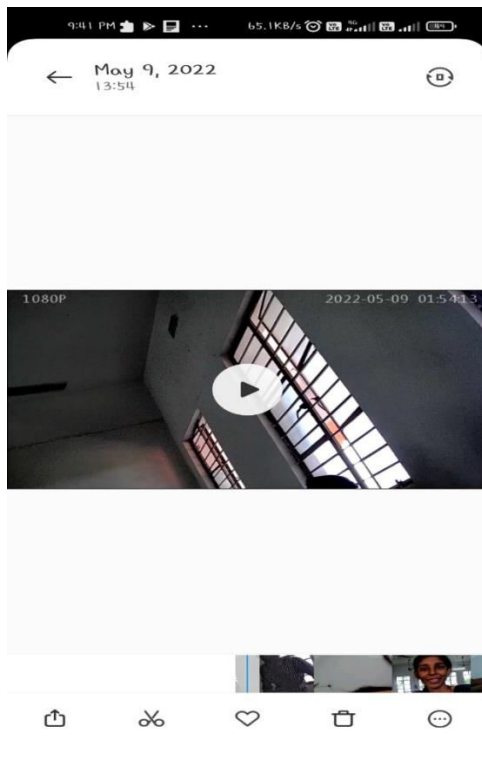


Figure 11. Output

V. ADVANTAGES AND APPLICATIONS

5.1 Advantages

- It is simple to maintain surveillance.
- It is highly dynamic in nature.
- It is simple to handle and operate.
- It can travel to any surface.
- It may be utilized in military search and rescue operations.

5.2 Applications

- Military activities are conducted.
- Surveillance near the border
- Operation Search and Rescue

VI. CONCLUSION

In this project extend a robot utilizing night vision remote camera run by android application and the individuals can learn around creating android application in arrange to control the robot through remote application. The robot has diminished the human exertion. The robot is outlined with tall exactness in development area. In quite satisfactory manner we have achieved all the required outcomes with almost satisfactory outputs. The work that our 110 degree rotating camera performed is also quite appreciable as it can record even in complete darkness but in future we can make it more satisfying by adding some voice recognition system also and hence camera must work according to the voice notes that we provide to it. Hence, this is one such improvement that we could introduce in it to make it more worth it. The robot can be improvised more and make it more useful by introduction of gas sensors and defusing capability of bombs. The footages visible with our camera operating even at night, its controlling transmission is upto 50mW and that of transmitting capability is about 20MHz which we have used here in our robot system. The mobile screen on which pictures are displayed for that purpose we have to install another Mi app meant especially for camera so the videos of places which are even very far is visible to us clearly. Efficient transmission of videos that we can provide is approximately up to 100 m involving negligence of any obstacles that comes in between the transmission and reception of signals such as dividers, floors and windows. The camera can even extend up and down also approximately by 180 degrees. This permit for aexpansion. By utilizing the RF signals, characters are coded and hence signal is send to the sender. With its help there is some sort of help provided to an area of intruder. It can also be helpful to us in case of disasters caused and to keep check whether the people present there have got any sort of harm or not as in case of building falling due to earthquake.

VII. FUTURE SCOPE

The robot's scaling can be even reduced more if we wish to do so according to our needs in any circumstance in future. The obstruction which could be caused by this is its extension. The robot can be made more scaled down in measure. One of the impediments of this robot is the extend of the robot. To extend it we have to extend numerous other modules such as range of Wi-Fi and GSM can be utilized. The Wi-Fi Module used here has some limitations such as if proper Wi-Fi Network is available then the robot can be utilized in a far better way and it also has some distance range also. It can be operated over very large distance such as up to few kms, instead it can be operated up to some meters only. In coming period, this robot can be used with gas sensors to differentiate between harmful and non-harmful gases present in our surroundings and nature as well as can be utilized to diffuse bombs only if we have

used this robot for spying purpose which would alert us providing the necessary information of installation of bombs in any particular region. We are able moreover incorporate confront acknowledgment innovation in future. The change can be improvised by contributing to acceptance of circuit and controlling it by the corresponding utilization of satellites. It may be used as terminating work when any enemy is caught in case. It can be used in for shopping purposes as in drop trolleys also and in painting of car. It can be used as a voice recognition system also where the voice can be used to give commands and according the robot may work

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper.

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