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War Spying Robot with Wireless Night Vision Camera

Divya Sharma
School of Electrical, Electronics and Communication Engineering
Galgotias University
Greater Noida, India
divyasharma@galgotiasuniversity.edu.in

Usha Chauhan
School of Electrical, Electronics and Communication Engineering
Galgotias University
Greater Noida, India
usha.chauhan@galgotiasuniversity.edu.in

***Abstract*—The main aim and objective of this project is to deal with the security issues such as combating of the terrorists activities by tracking their locations and launch pads and reducing soldier's efforts and involvement in the mission. This can be achieved by the RF BASED spy robot which consists of a night vision wireless camera. The robot consists of night vision camera which is wireless and it can record real time videos and footages even in dark and these footages are displayed on our mobile screen which is connected through Wi-Fi via MI-app spy. This robot is capable carrying all kinds of military operations under all conditions without much involvement of the soldiers, thus saving the loss of lives and neutralizing any terrorists' activities. This can be also useful in gathering information about the arms and ammunitions of the rivals, destroying them from a sufficient safe distance. This device can easily be connected to the rocket launcher and tanks, acting as a guide machine. Not only in defense sector but also in disaster management can be fruitful in managing the situations like flood, earthquakes etc. This can be easily operated either through Bluetooth or Wi-Fi. But in our project we are more concerned and focused on Wi-Fi, since it has better communication parameters and range.**

Keywords— Robot, MCU ESP8266, Night Vision Camera, 293D, Mi Camera, Wifi-module.

I. INTRODUCTION

In today's rapid growing generation, the development in the field of new techniques has brought a vast and massive change in the field of mechanics, automation and advancement in all the sectors of our day to day life either related to family or social welfare. In all aspects we are experiencing now-a-day some or the other way kind of changes. All over the world showoffs due to sharply –witted mobiles have brought a drastic revolution in one's living standard and various other aspects of life. One such example is based on android applications which provides us complete open environment to do anything we are pleased with, related to any field we are that we are interested in guiding us in our daily life. The primary objective behind creation of this robot keeping a alert watch especially in war field when something fishy is caught at border side due to some suspected act of enemy or any if any unnatural things is felt to happen. This is done so, in order to avoid loss of human life as the military personnel have great danger of losing their life if they are found to spying any suspected area. So, to avoid it this robot will be useful to use in such cases. This robot vehicle will serve as an suitable material not only in aspect of providing border security but moreover can be utilized for different characteristic adversity and this machine for the defense segment will reduce loss of human life too. It may guide all the military personnel and make them prepared for any misfortune if going to occur within their shelter region. Different Finder can be utilized that can be embedded on mechanical vehicle like metallic finder sensor is utilized to distinguish metallic objects . Fire finder is utilized to distinguish correct heading of fire source. This robot is valuable at places where one cannot reach like mystery spots or little areas. The foremost centre of this sort of model is to supply one extraordinary security degree.

The great advancement that we come across in in designing this robot is the use of Wi-Fi. We can use here bluetooth module also instead of Wi-Fi but Bluetooth have a short range of connection to make the robot work more efficiently as compared to Wi-Fi based system. Wi-Fi technique is useful in case if we are very far from the gadget also but our connection and Wi-Fi network is good then it works more significantly. The Node MCU ESP8266 used here acts as a link between the camera and the motor driver module fixed on the robot. It consists of motor driver module acts as a controller to contol the motion of the robot for working of the wheels of the robot fixed in it. The motor module used is named as L293D and a connector is provided between Node MCU module and motor driver module. That connector will be utilized for supplying external power supply. Four wheels are which operates on DC Motor is used for the motion of the robot. The camera used here can rotate whole 360 degree to record each and everything at every side wherever we wish to figure out the situation at the place where it is used for spying purpose.

II. LITERATURE REVIEW

After going through various articles and research papers we concluded that some of the papers were beneficial for designing our project and make it a successful one. In Military Spying Robot by Sarmad Hameed, Muhammad Hamza

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Khan, Naqi Jafri**,** the massive tasks is dangerous in war field. In border region it gets difficult for the humans working in the battle field to protect themselves from harm. Both protecting themselves and keeping keen observation on enemy becomes a little bit difficult task so in that situation robot is better option. Consequently robot replaces the trooper. In Spying Robot With Night Vision Camera by Aaruni Jha, Apoorva Singh, Ravinder Turna -The robot sends the flag to the RF collector mounted on the robot through RF transmitter at the base station. Due to this robot records real time footages and videos and can deliver those at our phone screen even in dark also as LED lights are used which even the enemy in the at border region or in suspected area can't even recognize that something is getting recorded. And the work done by PriyankaYadav, Swati Gawhale-She concluded that during the period of battle against enemy this robot can be used to collect all the necessary data that may weaken the opponent's plan if in case plotting something dangerous to attack them. In this way the military men would get prepared themselves for anything that the opponent is plotting against them and retort to their action in a better way that the enemy could not even think of at correct time.

Our goal is to build a mechanical motor type vehicle which is controlled by means of android application which in turn is connected to MI app which can record videos and hence can be used for observation purposes. To reach bomb's area it might be necessary to climb stairs and crawl through some or the other way and sometimes have to take rest in order to please the mission so in such cases this master framework is very useful for our leaders. Since the robot has night vision camera joined it canbe used even in darker places. The Wi-Fi and microcontroller attached on the motor driver both will get the directions which will be send by android application linked to MI-app .Future enhancement may make it beneficial for the use of shopping purposes ,medication if supported by military programs ,drop trolleys and car painting vehicle also.

III. EXISTING AND PROPOSED SYSTEM

Motor Driver Module is used in this robot. A Wi-Fi Module ESP8266 is also mounted on the board. The Mobile app used is connected with the Wi-Fi. After the connection between mobile app and Wi-Fi is set up, the app will ask to configure it. We will configure by registering the app by entering user id and passcode .In that app controlling switches will be developed to control the motion of the robot in either of any direction. Once this controlling switches are developed in the app, the robot can move and the camera can record anything and deliver it to us on our phone screen via another camera app installed on our mobile phone.

The component of System Architecture

1. Wi-Fi module-This module can be used as a self-contained System-On-Chip with coordinates TCP/IP convention stack that can deliver, to get our Wi-Fi arrange.

2. Micro-Controller –ATmega16-This microcontroller is used to send commands in order to control the movement of robot left or right, front or back, up or down etc.

3. DC Motor-It changes to coordinate electrical current vitality to mechanical vitality which is of 12 V.

4. Motor Driver-It makes the motor move as per required according to the instructions given.

5. Voltage Converter-This is used to change electrical output to power source.

6. 12V battery-This supply is given to the motor driver .Its capacity is about 2400mah.

7.7.4 V battery-This supply is given to voltage converter.

8. Tyres- Four tyres are used which is of 300 revolution per minute (rpm).

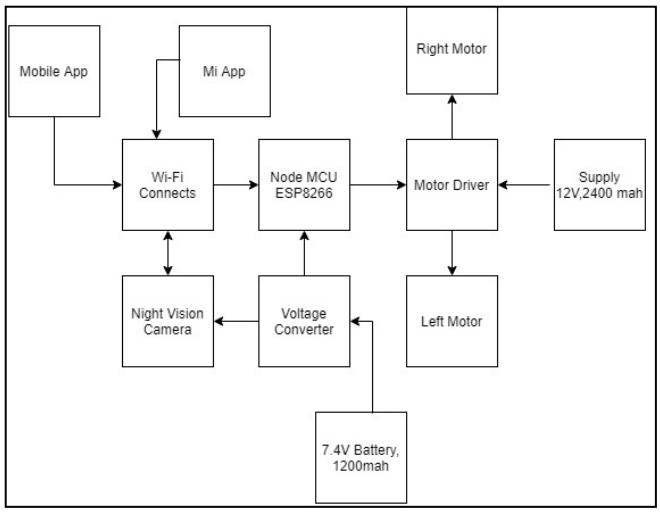

Fig 1. Block Diagram

IV. BLOCK DIAGRAM DESCRIPTION

In this two external power supply is provided at two separate nodes .One is givento the motor driver and the other to the voltage converter. An external 12 V battery power supply is given to the motor driver whose storage capacity is approx. 2400 mah. The supply further is distributed among the two left and right motors provided at both the sides of motor driver. Node MCU module ESP-8266 is connected to the motor driver. Node MCU module is an open source firmware and development kit that helps us to build any prototype of anything or IOT based products.

Another 7.4 V battery is fed to voltage converter which converts any electrical output into power form and this now fed into the night vision wireless camera. A bunch of IR LEDs are utilized to for giving light to picture source. The

purpose of using these IR LEDs is at night it's completely dark and hardly anything is visible so in order to provide light of illumination infrared is best option to go for, which is these LEDs use. The camera power is 5V which captures the images and videos and display on our mobile screen or laptop screen (optional) via Wi-Fi connection. Since we are using hearing MI-camera so MI-app is also installed on respective mobile or laptop so that real time videos can also be captured. Node MCU Module is also connected with Wi-Fi. We can also use Bluetooth instead of Wi-Fi but its range is short as compared to Wi-Fi.

A. Night Vision Camera

The Night Vision Camera used here is nothing but the Mi-Camera which has a cluster of infrared LEDs that helps us to provide visibility even in complete darkness, As infrared light has low energetic radiation as compared to others. Human eyes are able to see as it were a little portion of electromagnetic radiation which is called as "Visible Spectrum."

Infrared light is a light that can record the footages even in dark, smog, or fog. Penetration power is very high which makes it suitable for spying purpose. Things which are not visible through the human naked human eye infrared light have the capability to make the things visible.

1) Transmission Control:50mW
2) Transfer speed: 200MHz
3) Control Supply:5 V
4) Utilization Current:1A

B. L293D Motor Driver

It forms a shape in the form of a bridge called H-Bridge which is doubled sided because on its two sides left and right motor is fixed in the form of H- shape. It can convert low current control signal to high and hence called current amplifiers. This higher current only drives motor. It has two inbuilt motor driver circuits shown in the block diagram above which can drive motor simultaneously in forward and reverse direction.

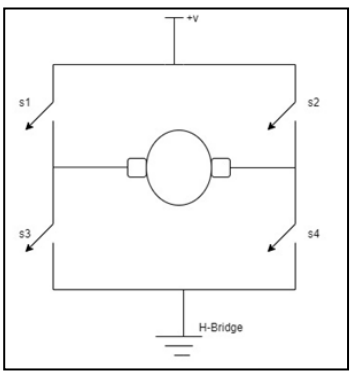

Fig. 2 Motor Driver Circuit

C. Wi-Fi Module

1. Send emails, text notifications and stats alerts.

2. Receive alerts on our phone, tablet or computer.

3. Require downloading Android or Apple app.

4. Remote monitoring.

D. Mi-Camera

The camera will be controlled through Wi-Fi.The camera records real time videos & if we want to store the data we can use SD card.

Specifications:-

Product dimensions	78x78x118mm
(LxBxH)	239g
Input Power	5V-1A
Camera Angle	110 °
Resolution	1080p
Focal length	3.9mm
Working temperature	-10 °C ~ 50 ° C
Connectivity	Wi-Fi IEEE 802.11b/g/n 2.4GHz
Storage	Micro SD card (support 16GB to 64 GB , Class 10 and above storage card)
Support Devices	Android 4.4 above or IOS 9.0 above

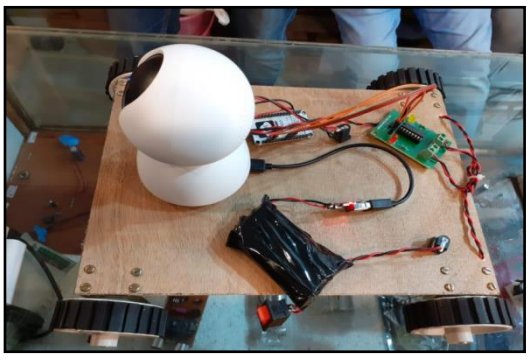

Fig 3. War Spying Robot Using Night Vision wire-less Camera

V. WORKING

This project is mainly meant for spying purpose which will be controlled through a mobile app, a camera is fitted in

this spying robot so that it can record the things such as any videos or footages and can be delivered those things to the spying troop keeping secret watch in suspected region or person. The robot is designed miniature in size so that they are hidden from the suspected person and could even enter at places where individual themselves cannot go and check out the things if any fishy thing has happens. Our purpose is just to make this robot move which will be controlled by a mobile app called “Blynk”. The robot must be handled very carefully and secretly so that it’s not caught by any suspected person. It has camera which in turn is controlled by battery, apps. We are using two apps to control the whole robot with the help of Wi-Fi module. It will help us to record all the videos and information regarding anything for which we want to gather and will display it on our mobile screen. If we want to record anything in dark areas then for that purpose LED light is used in the camera. Node MCU module, ESP8266 is used in it for the transmission and reception of signals from the app to the robot so that we can tackle and operate the motion of robot. To control the motion of the robot we are using two apps, one is “Blynk” app and the other one is “Xiaomi Home” app.

A. Bylnk App

In this app we have to design four switches , i.e., left ,right, forward and reverse according to which the motion of robot could be controlled either moving it left ,right, forward or in backward direction. We will connect this app with Wi-Fi and once it gets connected to it we will register the app by entering the user id and password for it and then it gets connected. In this way the motion of the robot is controlled through this.

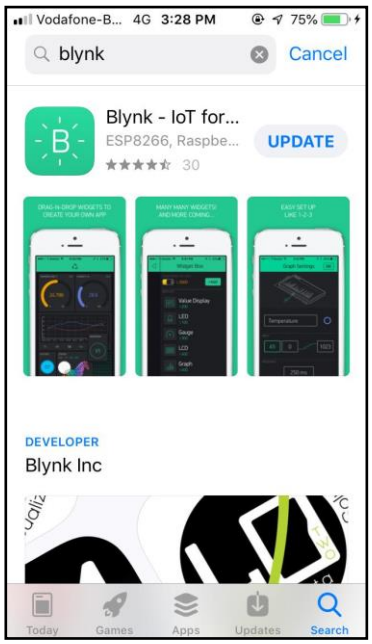

Fig 4. Blynk app

B. Xiaomi home App

It is similar to the Mobile app, Blynk but its purpose is different from that .It is camera app in which we can see the videos or footages that our robot records during spying. In this also we have to get it connected with the Wi-Fi and once it gets connected we will register it with user id and password and hence it will also get connected to Wi-Fi Network. Now we can see the images, videos which the camera captures fitted on our spying robot system.

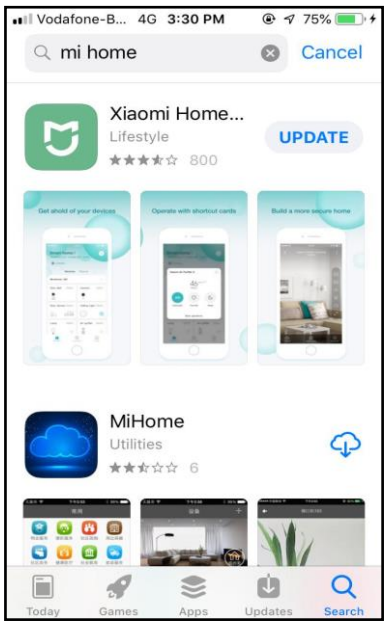

Fig 5. Xiaomi app

VI. ADVANTAGES, DISADVANTAGE AND APPLICATIONS

In different ranges there's a require of consistent reconnaissance. The current framework incorporates checking by utilizing CCTV cameras and other observing framework. For the most part these frameworks are stationary and they can cover a constrained region. These frameworks are generally control physically or through a computer. They cannot be utilized to cover a bigger zone as well frameworks are energetic sufficient much which gives the require for the improvement of an observation framework which is more energetic and can be controlled remotely.

Advantage

1. Easy to keep surveillance
2. Highly dynamic in nature
3. Easy to control and operate
4. It can move to any of the surface
5. It can be used in search and rescue operation of military

Disadvantages

1. Limited distance of operation(50ft)
2. Cost effective
3. It can be easily destroyed by enemy

Applications

1. Military operations.
2. Surveillance along border.
3. Search and Rescue Operation.
4. Manoeuvring in hazardous environment
5. Can be used in aerospace, domestic households and remote areas
6. Can be used in providing services at hotels and resort like robot being used these days for delivery foods and medicines to corona patients in the house to avoid contacts and spread of virus.

VII. RESULT

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 360 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 upto 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 a expansive field of vision.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.

VIII. DIRECTIONS FOR FUTURE SCOPE AND RESEARCH

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 extention. 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 upto few kms ,instead it can be operated upto 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 utilisation 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.

REFERENCES

[1] PAVITHRA S & SIVA SANKARI SA, "7TH SENSE-A MULTIPURPOSE ROBOT FOR MILITARY", IEEE INTERNATIONAL CONFERENCE ON INFORMATION COMMUNICATION AND EMBEDDED SYSTEMS (ICICES), (2013), PP.1224-1228.

[2] DA X, LI WH & SHANCANG L, "INTERNET OF THINGS IN INDUSTRIES: A SURVEY", IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL.10, NO.4, (2014), PP.2233-2243.

[3] APPINVENTOR, M, MIT APP INVENTOR. TECHNICAL REPORT, HTTP://APPINVENTOR. MIT. EDU/EXPLORE, (2015).

[4]HC-12 BLUETOOTH MODULE OF 1200M RAINGE HTTPS://WWW.ELECROW.COM/DOWNLOAD/HC-12.PDF

[5]DETECTOR HTTP://WWW.INSTRUCTABLES.COM/ID/VELLEMAN-K7102-METAL-DETECTOR-KIT/

[6]SOLIDWORKS BY USING CAD MODELING HTTP://WWW.SOLIDWORKS.IN/

[7] PCB CAD MODELING BY USING EAGAL CAD HTTPS://WWW.AUTODESK.COM/PRODUCTS/EAGLE/OVERVIEW

[8] SARANLI U, BUEHLER M & KODITSCHEK DE, "RHEX: A SIMPLE AND HIGHLY MOBILE HEXAPOD ROBOT", THE INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH, VOL.20, NO.7, (2001), PP.616–631.

[9]STEPPER MOTOR HTTPS://LEARN.ADAFRUIT.COM/ALL-ABOUT-STEPPER-MOTORS/WHAT-IS-A-STEPPER-MOTOR [10] A4988 STEPPER MODULEHTTPS://WWW .ALLEGROMICRO.COM/EN/ PRODUCTS /MOTOR-DRIVER -AND-INTERFACE-ICS/BIPOLAR-STEPPER-MOTOR-DRIVERS /A4988.ASPX

[11] SARANLI U, MARTIN B & DANIEL EK, "RHEX: A SIMPLE AND HIGHLY MOBILE HEXAPOD ROBOT", THE INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH, VOL.20, NO.7, (2001), PP.616-631.

[12] MCMORDLE D & BUEHLER M, TOWARDS PRONKING WITH A HEXAPOD ROBOT. INTERNATIONAL CONFERENCE ON CLIMBING AND WALKING ROBOTS, (2001).

[13] KOMSUOËŸGLU H, MCMORDIE D, SARANLÄS U, MOORE N, BUEHLER M & KODITSCHEK D, "PROPRIOCEPTION BASED BEHAVIORAL ADVANCES IN A HEXAPOD ROBOT", PROCEEDINGS OF THE IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION, (2001). [14] SARANLI U, RIZZI AA & KODITSCHEK DE, "MODEL-BASED DYNAMIC SELF-RIGHTING MANEUVERS FOR A HEXAPEDAL ROBOT", THE INTERNATIONAL JOURNAL OF ROBOTICS RESEARCH, VOL.23, NO.9, (2004), PP.903-918.

[15] HTTP://WWW.TI.COM/LIT/DS/SYMLINK/L293.PDF.

[16] MURRAY RM. A MATHEMATICAL INTRODUCTION TO ROBOTIC MANIPULATION. CRC PRESS, (2017).

[17] VOYLES R & LARSON A, TERMINATORBOT: A NOVEL ROBOT WITH DUAL USE MECHANISM FOR LOCOMOTION AND MANIPULATION", IEEE/ASME TRANSACTIONS ON MECHATRONICS, VOL.10, NO.1, (2005), PP.17-25.