DESIGN AND ANALYSIS OF IOT BASED MILITARY SURVEILLANCE ROBOT BY USING BLYNK APPLICATION

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Abstract-This paper presents a recent approach for observation at border areas and remote using multifunctional robot based on recent IOT used in military applications and defense. This robotic vehicle has facility other the solider at border area provide observation. This multifunctional robot used to notice presence of enemy capture it in camera and give the live streaming to the official person observation is major role while we working on border area for this there is robot for observation purpose. The robotic vehicle works as sovereign and automatically controlled vehicle using cyberspace communication medium. A country safe keeping is the most important part which plays a vital role in a country growth, Development and budget. So many soldiers are securing the country by meticulous observation throughout the border. Inorder to make this much more sufficient, we are using over which can move tone place to other place, where it is challenging for human stood their job. The main concept of this paper is to continuously monitor the border through a livestreaming rover which can be controlled and can move to any direction using android application by means of wireless networks. The Video Streaming is done using blink application camera. The embedded programming language is used for the blink application. The rover will mechanism with greater ability which is capable of operating in multifunctional Surface while keeping all wheels in contact with ground surface. Finally, the main application is observation across the international borders for 24-hour care of any illegal or doubtful activities, metal recognition through robot is equipped to send a live video feed and sensor data to the remote computer or "IOT" *internet of things+

Keywords: IOT, observation, Video Streaming, blink application, remote and border areas

1. INTRODUCTION:

The border area serves as a canal and source of business, tourism, and student- exchange that is vital to both countries (India-Pakistan), and it is the site of intense bi-national combination and cooperation, especially on issues of shared importance, such as environment and the transportation infrastructure. Key law enforcement efforts to counter international crime occur in the border area, and the nature of border ecosystems, which ignore national boundaries, accentuates the importance of meaningful cooperation between the two countries to protect shared natural resources and habitats [1]. It has cameras on it for the purpose of video observation. The robotic arm mounted on it makes it a multi-purpose machine. The main application is observation across the international borders for monitoring of any illegal or suspicious activities, intrusions or ceasefires violations [1]. Conventional CCTV security solution is based upon CCTV cameras, DVRs (Digital Video Recorders), and TV monitors. A group of human operators is responsible to find out an abnormal situation, while looking over live camera images displayed on a series of TV monitors, and takes a counter activity. Some updated systems use CMS (Central Monitoring System) software to display live images on PC monitors, and users can change the arrangement of images and integrate IR sensors, which are typically used to provide an intrusion alarm. Some of the cameras are mounted on pan-tilt devices and human operators can select and move a camera to a desired position using a keypad and a joystick. In such an environment, operators are drone to failure to detect ana b normal situation due to human factors, and recorded images from DVRs were mostly referred only incident to search for clues or evidences for tracking [2,3 &4].

This paper presents a modern approach for observation using a Robot . The observation system is one which is used for the purpose of security. This system is designed to develop a video 24-hour care, capturing the image and to store video frames for further verification. Video observation is the process of monitoring a situation, an area or a person.

The robot is controlled sitting at a far secure place and safely devise a plan to tackle their activities it acquires image from cameras through a web browser, wi-fi or a mobile application[5].

An **Internet Protocol camera**, or **IP camera** or **Mobile camera**, is a type of digital video cameras that receives control data and sends image data via the Internet. They are commonly used for observation but unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network [6]. Most IP cameras are webcams, but the term IP camera or **netcam** usually applies only to those that can be directly accessed

over a network connection, usually used for observation

The main objectives of our study are:

- This rover can easily move in different landscapes and can be operated easily.
- This Mobile camera is attached to a rover which can move along the border and can be monitored continuously
- Itisveryusefulinsavingthelifeofasoldierwhoriskshislifeguardingthe country at the border.
- It is beneficial in wild climatic conditions where humans cannot withstand to the environment.

2. MATERIALS AND METHODS

Design of live streaming rover

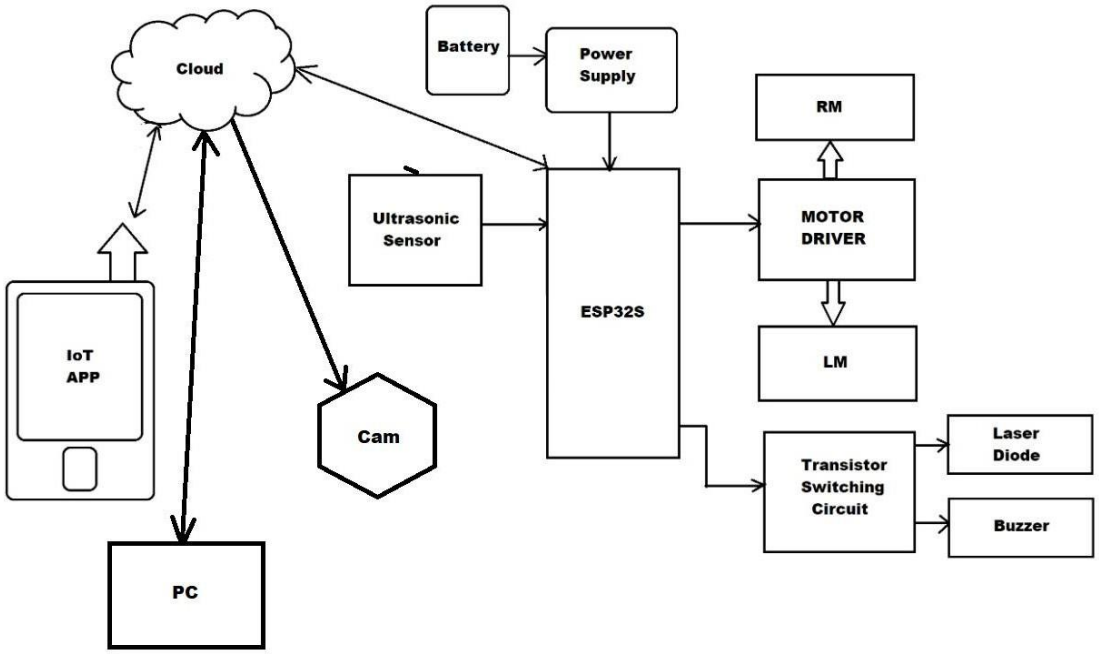
Existing Method:

Closed-circuit television (**CCTV**), also known as **video observation**, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point- to-point (P2P), point-to-multipoint (P2MP), or mesh wired or wireless links. Though almost all video cameras fit this definition, the term is most often applied to those used for surveillance in areas that may need monitoring such as banks, stores, and other areas where security is needed. Though video telephony is seldom called 'CCTV' one exception is the use of video in distance education, where it is an important tool.

Fig: 3.1 Fixed camera

Block Diagram of Live Streaming Rover:

Block diagram consists of Node MCU ESP8266, Motor driver L298n , Geared Motor , Power Supply, Battery, IPCamera .Blynk App is used to control the movement of the robot and even the output parameters are displayed using the Blynk App Platform. IR Sensor will detect the obstacles in the surroundings and generated output can be seen as message in blynk app. Motor Driver is used to run the geared motor to move the rover in any direction. IP camera is used for continuous surveillance and can be recorded in the mobile or system using internet.



Block Diagram of live streaming rover

3. **Working**:

The IR Sensor is associated to the ESP8266. When the node MCU is connected to the Wi-Fi, the red LED will turn ON which indicates that the internet is connected.

Geared Motors are controlled by the Motor Driver. Motor Driver works by the principle of H- bridge concept. The four arms of the geared motor are to the motor driver pins. Motor drivers act as an boundary between the motors and the control circuits. Motors require high amount of current whereas the controller circuit works on low current signals. The function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.

The controlling of motor driver is done with the help of Blynk App. The Blynk app is an IoT platform. It can control hardware remotely.

- It can store data, visualize it and do many other things.
- It can display sensor data.

There are three major components in the plat form:-

- Blynk app: Allows to create interfaces using various widgets.
- Blynk server: It provides communication between hardware and Smart phone.
- Blynk libraries: It enables communication with the server and process all the incoming and outgoing commands.

IP Camera is used for observation. The live streaming video which is captured through Ip camera is monitored through IP WEBCAM. IP WEBCAM is a new generation of intelligent household cloud camera free application, can easily realize the remote video monitoring and management.

IP WEBCAM has many extra features like capturing the photo while the video is streaming, recorded video and captured pictures will be stored in memory.

This system reduces the risk of human life

4. Tools Required:

4.1 Hardware Tool:

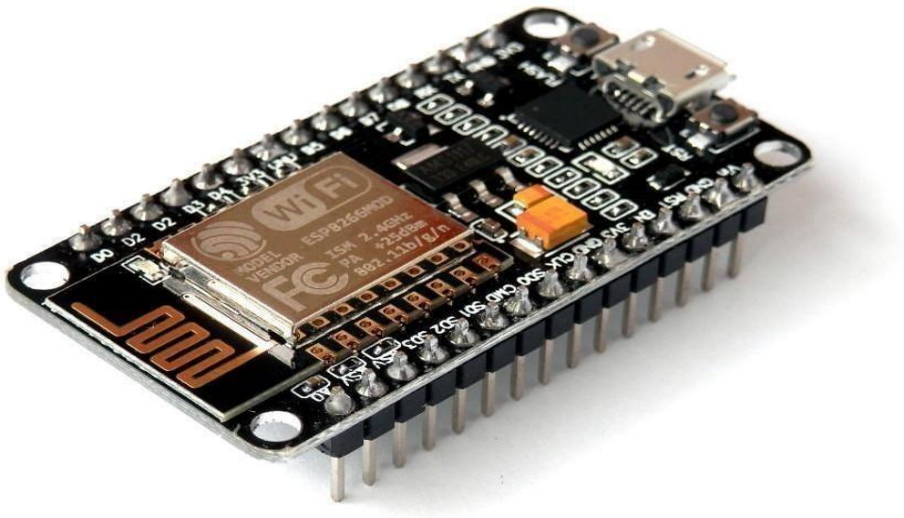
- Node MCU -ESP8266
- IR Sensor Geared Motors
- Motor Driver- L298n Mobile
- Power Supply- 12V battery

4.2 Software Tools:

- Blynk App
- IPWEBCAM
- Arduino IDE software

4.1 Hardware description

4.1.1 Node MCUESP8266



Node MCU ESP8266 [11]

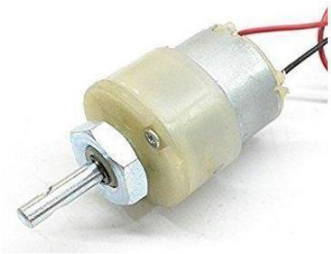
Specifications

- Node MCU is an open source LUA based firmware advanced aimed at ESP8266 wi-fi chip. By exploring functionality with ESP8266 chip, Node MCU firmware comes with ESP8266 Expansion board/kit i.e. Node MCU Expansion board.

- Since Node MCU is open source platform, their hardware design is open for edit/modify/build.
- Node MCU Dev Kit/board consist of ESP8266 wi-fi enabled chip. The ESP8266isalow-costWi-FichipadvancedbyExpressiveSystemswithTCP/IP protocol. For more information about ESP8266, you can refer ESP8266 Wi-Fi Module
- There is Version2 (V2) available for Node MCU Dev Kit i.e. Node MCU Development Board v1.0 (Version2), which usually comes in black colored PCB
- Node MCU Dev Kit has Arduino like Analog (i.e. A0) and Digital pins on its board.
- It supports serial communication protocols i.e. UART, SPI, I2C etc.

4.1.2Geared DC Motors:

DC motors usually run at too high a speed and too low a torque. In order to use these motors for robotic request, these presences should be enhanced. Gearboxes are used for this purpose. Linking the shaft of a motor to a gear train causes the output shaft from the gear train to rotate much more slowly and to deliver enticingly more torque than the input shaft. DC motors [11]that have a gearbox accumulated to their shafts are called as gearhead DC motors, and these motor are most suitable motors for building many hobby robots.



Geared DC motor[12]

4.1.3 Motor DriverL298N

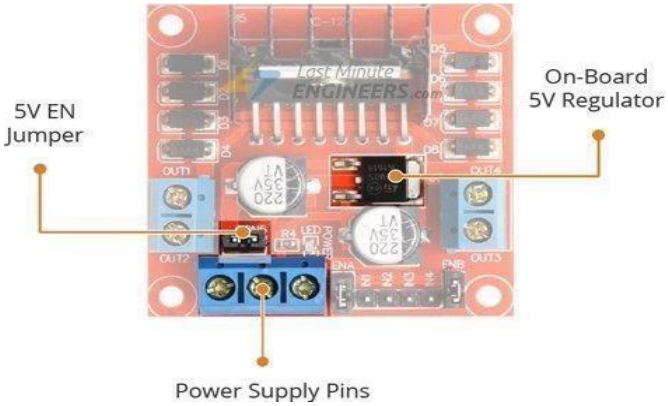
This L298N Based Motor Driver Module is a high power motor driver picture-perfect for driving DC Motors and Stepper Motors.

It uses the current L298 motor driver IC and has the aboard 5V regulator which it can supply to an external circuit. It can control up to 4 DC motors, or2 DC motors with directional and speed control. This motor driver is perfect for robotics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC Stepper motors for micro mouse, line following robots, robot arms, etc. H-Bridge is a circuit that can drive a current in either split and be controlled by Pulse Width Modulation (PWM).Pulse Width Modulation means that controlling the duration of an electronic pulse. Motors try to imagine the brush as a water wheel and electrons as the flowing droplets of water. Even the voltage would be the water flowing over the wheel at a constant rate, the more water flowing the higher the voltage. Motors are rated at certain voltages and can be damaged if the voltage is applied to heavily or if it is dropped quickly to slow the motor down thus PWM. Take the water wheel analogy and think of the water hitting it in pulses but at a constant flow .The longer the pulses the faster the wheel will turn, the shorter the pulses, the slower the water wheel will turn. Motors will last much longer and be more reliable if controlled through PWM.

Motor Driver L298N [13]

4.1.4 Power Supply

The L298N motor driver module is powered through 3-pin 3.5mm-pitch screw terminals. It consists of pins to motor power



supply(Vs), ground and 5V logic power supply (Vss).

The module has an on-board 78M05 5V regulator from STMicroelectronics. It can be enabled or disabled through jumper. When this jumper is in place, the 5V regulator is enabled, supplying logic power supply (Vss)from the motor power supply(Vs). In this case, the 5V input terminal acts as an output pin and delivers 5V 0.5A. You can use it for the power up and Arduino or other circuitry that requires 5V power supply.[14]

When the jumper is removed, the 5V regulator gets disabled and we have to supply 5 Volts separately through 5 Volt input terminal.

4.1.512 V battery:

12V power supplies (or 12VDC power supplies) are one of the most common power supplies in our daily lifes today. Linear regulated 12VDC power supplies regulate the output using a dissipative regulating circuit. They are very stable, have very low ripple, and have no switching frequencies to produce EMI.

12vbattery [15]

4.2 Software description

Blynk is a Platform with IOS and Android apps to manager Arduino and overcome the Internet. It's a digital tool panel where you can build a graphic interface for your project by simply tiresome and plummeting widgets.

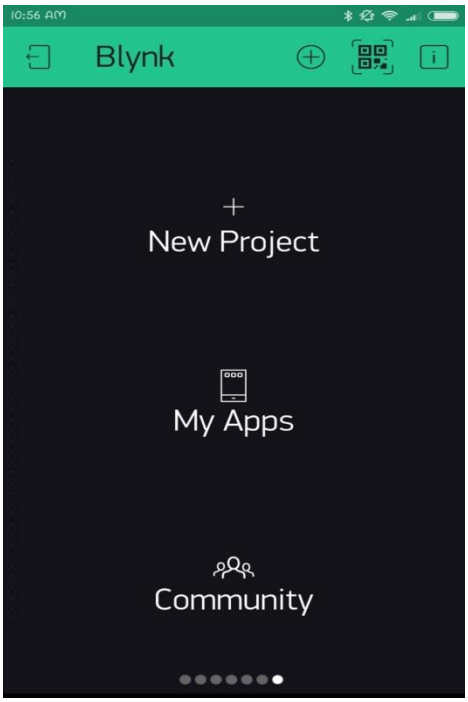
Blynk App

4.2.1 Supported Hardware Blynk App

Blynk application can be found from the subsequent links –

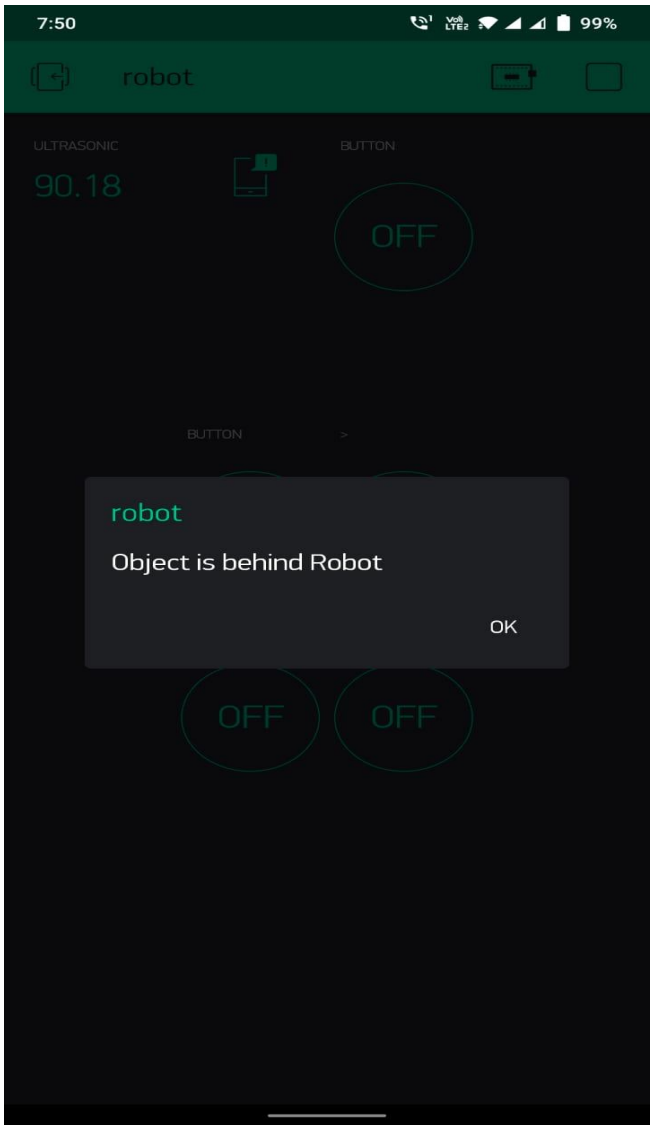
1. Android Blynk app
2. IOS Blynk app

After downloading the app, create an account and log in.



You'll also need to install the **Blynk Arduino Library**, which helps produce the firmware running on yourESP8266.

This output is obtained when a human or object is standing infront of the rover. This also categorizes an object when it comes in communication with rover. It is the ouput for every obstacle that makes contact with rover because rover is not made of artificial intelligence like robot. So it identifies all the objects which it detects as humans.



Output Widget Page of Blynk App

By using the Blynk app we can also get the announcement of metal is present behind the robot. When any metal (iron, steel, copper etc) are present near the robot. Then this closeness sensor will sense the metal and will send to the ESP8266. And this ESP8266 will detect the signal from closeness sensor and will send notification and shows in Blynk app.

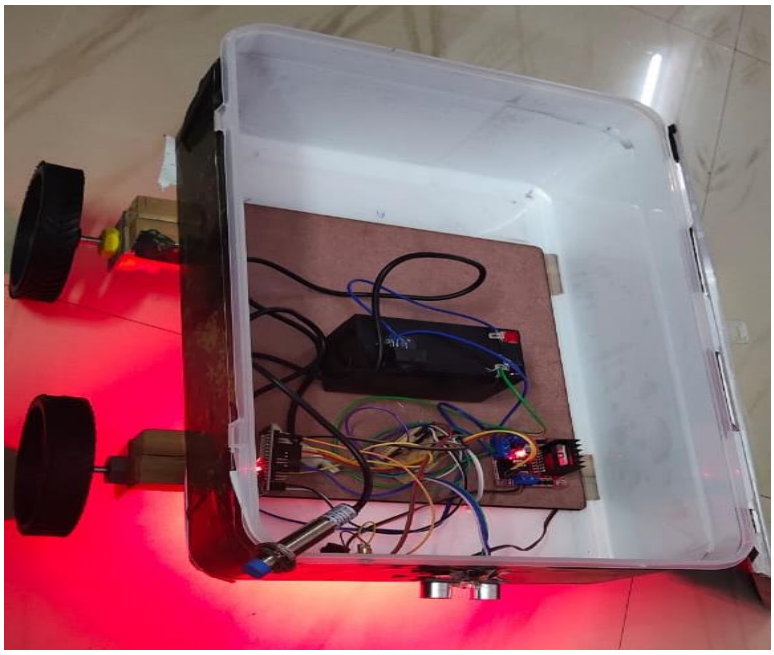
4.2.2 IP WEBCAM APP

An **Internet Protocol camera**, or **IP camera**, is a type of digital video camera that receives, control data and directs image data via an IP network. They are usually used for reflection but unlike analog closed-circuit television (CCTV) cameras, they require no local recording device, only a local area network. Most IP cameras are webcams, but the term IP camera or **netcam** frequently applies only to those that can be directly recovered over a network connection, usually used for observation.

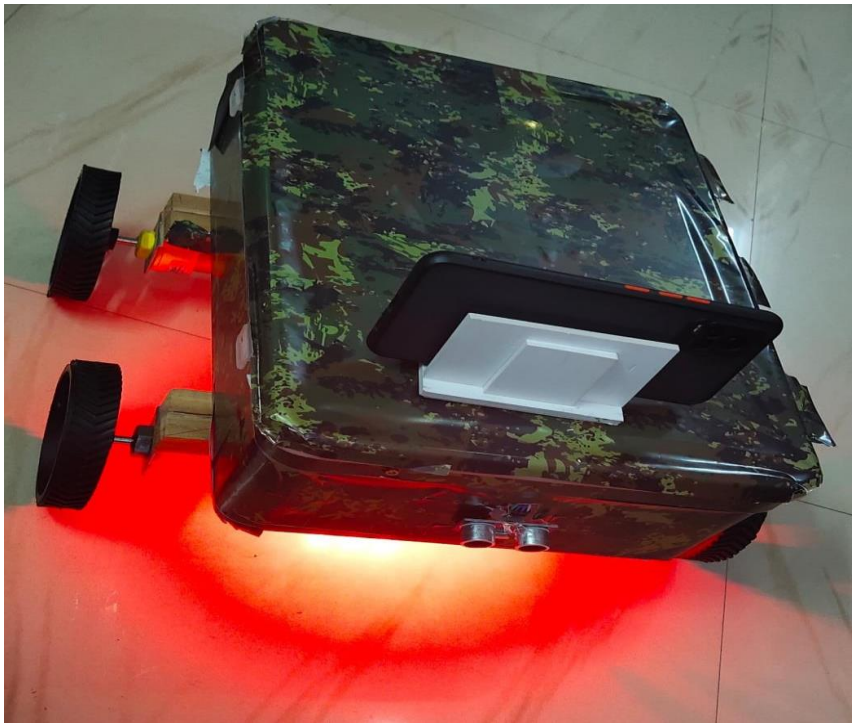
IPwebcam[16]

5. Results and discussions

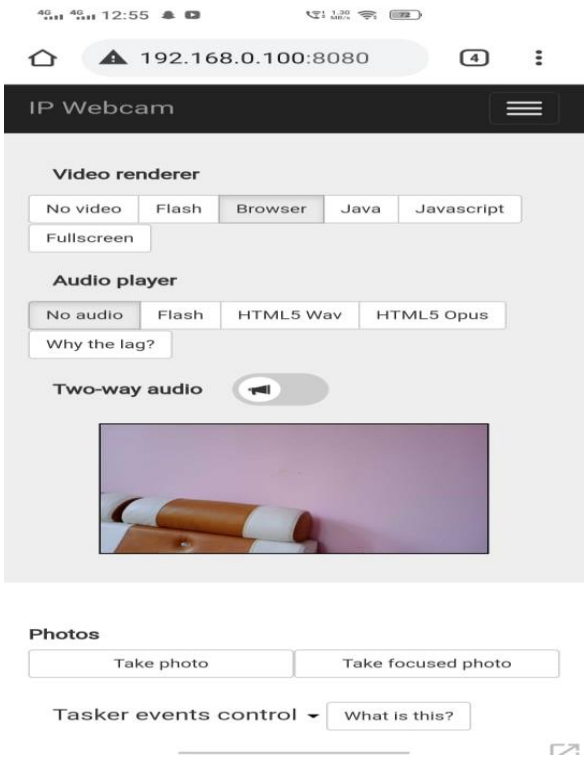
The preparation of apparatuses was shown in the below figure.



The vital setup shows over which consists Node MCUESP8266, Power Supply, Motor Driver, Geared motor. And to control the movement of the rover Blynk App Server is used. The output parameters obtained by sensors can be read in Blynk app.



The above figure shows the working of rover. The movement of the rover is measured by using Blynk app. When any person enters the camera region then a message will be generated and it is observed in the app. To obtain this process the Node MCU should be linked to the wi-fi or internet. The live streaming of Camera is observed using V380 app.

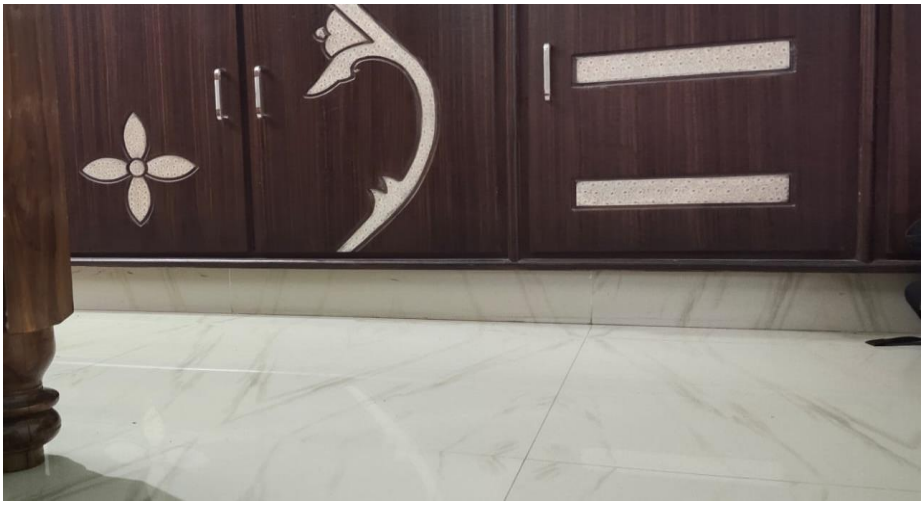


Camera viewer

The above figure shows the output i.e., live video from the camera. This has to be linked through wi-fi. This wi-fi which is linked to the mobile camera should be linked to the same network which has been linked to drive the rover.

So we just need to make sure that the rover and camera are linked to same network. throw the IP address, while monitoring, we can also take snapshots wherever needed. We can also record a specific situation that needed to be verified in case of any security alerts. This will be useful as proofs.

We can also watch again the live video by replay option for any alleged situations.



Snapshot taken when the camera is in on

So this normal mode, the camera will be working in wide-ranging day light or somewhere where there is some source of light. Open CV is computer vision library toper form the Face exposure and credit. This is also a color mode where we can differentiate the colors while 24-hour care or when a snapshot was taken. Colors can be distinguished when the video has been recorded. Robot with the help Of camera get face credit and according to that manually we give the command to the robot Inopportunely the current binary version of Open CV Available to install in the Raspberry an operating system through apt-get (version 2.3.x) is too old to contain the face recognition algorithms used by this project [7-10]

This snaps and video record can be saved in mobile or PC. To see and verify after the plotting the places. These snaps and videos can be used as proofs or esteem for military and polices.

6. CONCLUSION

In this paper we implement a smart observation rover for military application with the help of this rover the real time condition of border area without using a any human source. By Implementation of Border Security Live Streaming design, there is a scope to more facilities with Raspberry pi and open CV. The observation robot gives us live streaming video according to that we give the command. This system is capable of recording/capturing video/image. As we place a robot instead of human solider it is necessary that the robot will be defense himself and protect our nation from the enemy. To make robot self defense we give the robot laser gun. The laser gun with the help of open cv and raspberry pi camera will detect the enemy and shoot according to mode of operation i.e. automatic and manual mode. It will be a good application of surveillance robot to protect the nation from enemy.

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