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TELEPRESENCE SURVEILLANCE ROBOT

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ABSTRACT

A telepresence surveillance robot is a remote-controlled, wheeled device with a display to enable video streaming which enable the participants to view remote locations, as if they were there. This virtual surveillance robot allows the user to capturethe real-time video even when the robot is in a remote location and displays it on the user's desktop. This robot is a wheeled, Zigbee remote-controlled device with a camera to capture real-time video using Arduino in visual form. The Zigbee remote controller controls the movement and the direction of the Robot via Arduino. The Live streamed video can be received on any Smartphone device using the specified IP address by ESP32CAM.

INTRODUCTION

OBJECTIVE OF THE PROJECT

In today's world, the development of science and technology has introduced the concept of virtual reality and robotics. The term virtual reality means 'near-reality'.This concept enables people to be at more than one place at a single time. This robot enables to observe the people and their surrounding without being physically present. It helps one person feel more connected by giving a virtual presence where one can't give in physical. Robots have increased widely in today's world. In almost all industries, the concept of robotics is used as they are user friendly. The Robot used in this project uses a rechargeable battery. Telepresence uses virtual reality technology. The telepresence robot gives a virtual reality experience that can be felt by the user even

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when the robot is in any remote location. This paper explains the working of the robot and capturing of the visuals by ESP32 CAM, how to configure Wi-Fi and interfacing servomotors with Zigbee and geared motors with Arduino. It explains how the data is received, as signals, from an android application and sent to Zigbee and Arduino. The mini rover camera is stationary. As the rover moves, the camera moves along. In the proposed system, we have the facility to rotate the camera according to our head movement. The mini rover gives a normal display. Where as in the proposed system, get a virtual reality effect.

PROPOSED METHOD

The proposed system can be broken into two parts, the first one is at therobot side and contains various hardware's for movement control along with camera and a receiver for video streaming and instruction reception from the control station, The second one at the remote station end is software in the formof web applications for movement instruction and for displaying the streamingvideo. The link between the transducers at both ends is wireless.

OVERVIEW OF EMBEDED SYSTEM

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It isusually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become veryimportant today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economiesof scale.

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HARDWARE ASPECTS

BLOCK DIAGRAM

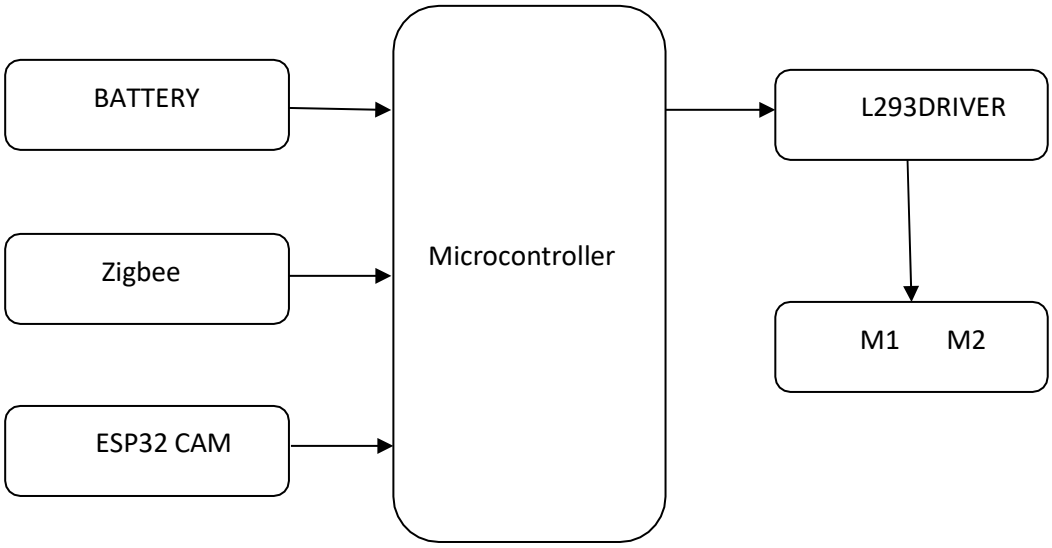

Figure.2.1. Block Diagram of Telepresence surveillance Robot

WORKING

A Telepresence surveillance robot is a remote-controlled, wheeled device with a display to enable video streaming which enable the participants to view remote locations, as if they were there. This virtual surveillance robot allows the user to capturethe real-time video even when the robot is in a remote location and displays it on the user's desktop. This robot is a wheeled, Zigbee remote-controlled device with a camerato capture real-time video using Arduino in visual form. The zigbee remote controller controls the movement and the direction of the Robot via Arduino. The Live streamed video can be received on any Smartphone device using the specified IP address by ESP32CAMERA.

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2.1. POWER SUPPLY:

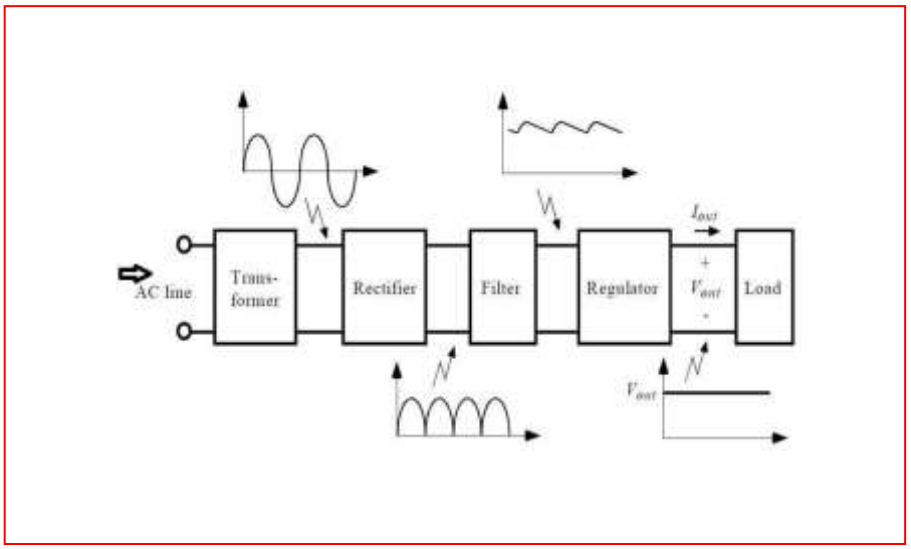


Figure.2.2. Power Supply

Transformer:

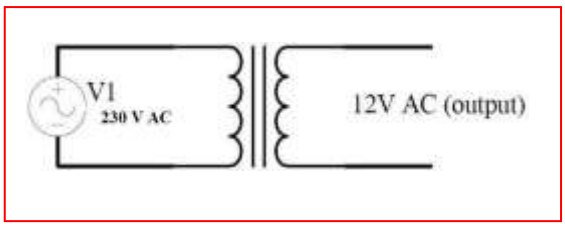
Transformer is a static device used to convert the voltage from one level to another level without change its frequency. There are two types of transformers

1. Step-up transformer
2. Step-down transformer

Step-up transformer converts low voltage level into high voltage level without change its frequency.

Step-down transformer converts high voltage level into low voltage level without change its frequency.

In this project we using step-down transformer which converts 230V AC to 12V AC [or] 230V AC to 5V as shown below.



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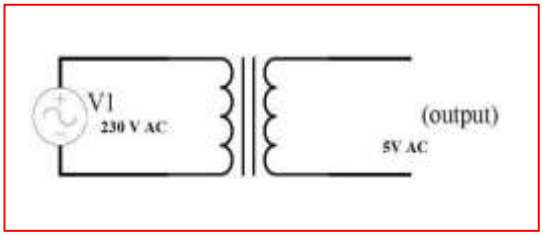

Figure.2.3. Transformers

ESP32-CAM Pinout

The following figure shows the ESP32-CAM pinout (AI-Thinker module).

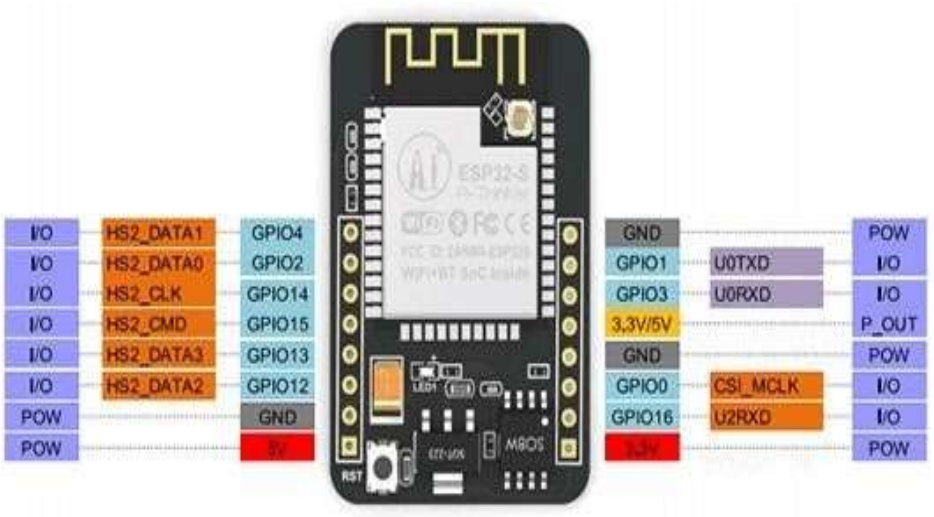

Figure 2.21. ESP32-CAM Pinout

There are three GND pins and two pins for power: either 3.3V or 5V. GPIO 1 and GPIO 3 are the serial pins. You need these pins to upload code to your board. Additionally, GPIO 0 also plays an important role, since it determines whether the ESP32 is in flashing mode or not. When GPIO 0 is connected to GND, the ESP32 is in flashing mode.

The following pins are internally connected to the microSD card reader:

- GPIO 14: CLK
- GPIO 15: CMD
- GPIO 2: Data 0
- GPIO 4: Data 1 (also connected to the on-board LED)
- GPIO 12: Data 2
- GPIO 13: Data 3

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- Important: GPIO 0 needs to be connected to GND so that you're able to upload code.

RESULTS

RESULTS

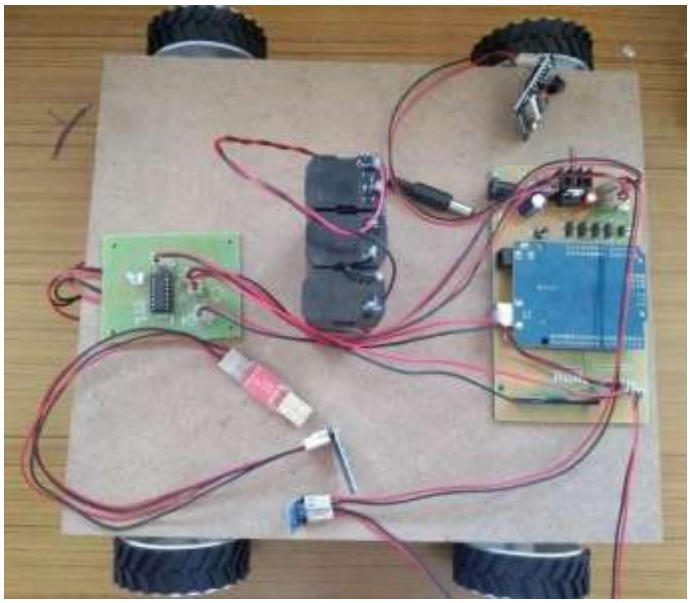

Figure.Photocopy of Telepresence Surveillance Robot

ADVANTAGES AND APPLICATIONS

ADVANTAGES

1. Robot can navigate the environment.
2. It can easily complete some tedious and repetitive activities without growing tired and requiring a break.
3. It can be made to perform even the most dangerous task without any concern.
4. Detecting and reporting anomalies in the environment.
5. It can move from one location to another location.
6. Consistency of performance

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APPLICATIONS

7. This robot is used to observe the behavior of wild animals where human beings cannot reach.
8. It is used in army and military applications.
9. Used in Industries.
10. Used in Chemical factories.
11. Inspection of contaminated/hazardous environment.

CONCLUSION

After successful integration of software and hardware components of telepresencesurveillance robot. We realized that this robot allows users to observe people and their surrounding environment without the need of any physical presence.

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FUTURE SCOPE

We can also use this robot in military, this robot can be sent for monitoring instead of a soldier. In this way, only robot gets damaged and no life is lost even if there is an unexpected attack. They can even provide home care assistance to the elderly. The robot can be used in fire and rescue operations if it is made fireproof.

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