

## WI-FI Controlled Robot

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**Abstract:** *An intelligent robot is a machine with the ability to extract information from its environment and use the knowledge of its surrounding to navigate safely in a meaningful manner. The ARM11 Based microcontroller is interfaced with Camera for video acquisition, USB Wi-Fi for transmitting video through Wireless and receives Control commands from remote places. Navigating the robot using wireless communication (Wi-Fi), is monitored in web browser and can be controlled from remote places. Robot navigation has been performed with condition that the control tool used by the remote operator has sufficient processing power for online video feed.*

**Keywords:** *robot, remote control, Wi-Fi.*

### 1. INTRODUCTION

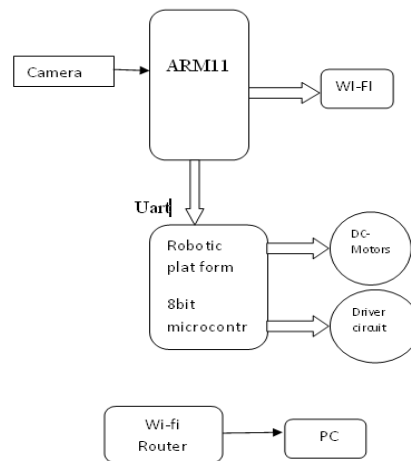
Robots are being used in variety of industrial applications for various activities Robots are becoming more and more intelligent as technology advances in the Areas of CPU speed, memories etc. And there is ever demanding Applications even in defense. Earlier we use human power for defusing the bomb. The additional features of this project are that the robot is controlled from webpage. If the technician is not present in the power plant then no need to worry he can access the robot from his home or anywhere. Which saves the travel expenses and time? Our robot consists of DC motor which helps in smooth moving of hands and Provides proper control on the robot movement. An intelligent robot is a machine with the ability to extract formation from its environment and use the knowledge of its surrounding to navigate safely in a meaningful manner. Development of robot's Movement mainly falls under the branch of mechanical, electronics and system control engineering. Design of the robot's behavior is a subset of artificial intelligence and computing. Another vital area of study in robotic is the human-robot interaction (HRI) due to close association between human and robot in various manners.

### 2. PROPOSED SYSTEM

In the proposed system the navigation of robot in different directions is controlled by Clint. If the robot is moving in a place where temperature is more, if the temperature reaches more then threshold voltage then automatically robot gets stop instead of moving forward. If we want the robot to makes some object to pick and place it in another place then we need to activate those robot arms remotely through our pc. We are interfacing sensors like: Temperature sensor, Obstacle sensor, Metal detectors to our robotic platform. The microcontroller also controls the switching of the transistors in the H-bridge circuit to determine the robot's navigational direction. Here the Raspberry Pi is connected to WI-FI and PC also connected to WI-FI. The USB webcam provides the visual feedback necessary for monitoring the robot from the remote end.

#### Block diagram

The robotic arm also gets controlled from the client side based on the visual feedback. The webpage will get open whenever we enter the IP address in the web browser. On the webpage we can observe live video streaming and robot control icons.



**Fig1.** Block diagram

### 3. HARDWARE & SOFTWARE IMPLEMENTATION

#### 3.1. Raspberry Pi

The Raspberry Pi is based on a Broadcom BCM2835 system on a chip (SoC), which incorporates an ARM1176JZF-S 700 MHz processor. The Raspberry Pi Foundation started off with a 256MB RAM, which was Labeled as Model A, and later made a Model B with 512MB RAM. The GPU used is the Video Core IV, owned by the Broadcom. It uses an SD card for booting and for memory as it doesn't have an inbuilt hard disk for storage option. In this project, control of robotic unit is from remote end with the use of Internet and also we are able to get the videos from the robot end for the purpose of surveillance. At the user PC, we will have videos on the web browser and also we are able to control the robotic movement and also the camera movement in vertical direction and horizontal direction.

#### 3.2. Robot Control Unit

A PIC microcontroller is a processor with built in memory. So it saves you building a circuit that has separate external RAM, ROM. Microchip is providing the 8-bit, 16-bit and the 32 bit microcontrollers. Based on the desired application requirement the design engineer can choose from those. The motor drivers are interfaced to PIC unit. DC motors are being used for the movement of robot wheels.

#### 3.3. DC Motor

DC motor is designed to run on DC electric power. The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600mA at voltages from 4.5 V to 36 V.

#### 3.4. Http Protocol

The **Hypertext Transfer Protocol (HTTP)** is an application protocol for distributed, Collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web. Hypertext is structured text that uses logical links (hyperlinks) between nodes containing text. HTTP is the protocol to exchange or transfer hypertext. HTTP functions as a request-response protocol in the client-server computing model. A web browser, for example, may be the *client* and an application running on a computer hosting a web site may be the *server*. The client submits an HTTP *request* message to the server. The server, which provides *resources* such as HTML files and other content, or performs other functions on behalf of the client, returns a *response* message to the client. The response contains completion status information about the request and may also contain requested content in its message body.

#### 3.5. Html

When you look at a web page in a web browser, you see, at the simplest level, words. These words usually have some style characteristics, such as different fonts, font sizes and colors. In many cases a page also displays images or maybe video. Sometimes there is a form where you can enter (or search)

for information, or customize the display of the page to your liking. Often a page contains content that moves or changes while the rest of the page remains the same.

### 3.6. Motion JPEG

In multimedia, **Motion JPEG (M-JPEG or MJPEG)** is a video compression format in which each video frame or interlaced field of a digital video sequence is compressed separately as a JPEG image. Mjpeg is a complete, cross-platform solution, convert and stream audio and video. Originally developed for multimedia PC applications, M-JPEG is now used by video-capture devices such as digital cameras, IP cameras, and webcams; and by non-linear video editing systems. It continues to enjoy native support by the QuickTime Player, the PlayStation console, and browsers such as Google Chrome and Mozilla Fire fox.

## 4. RESULTS

Login to putty for accessing raspberry pi platform. Run the script file as shown in fig 2.

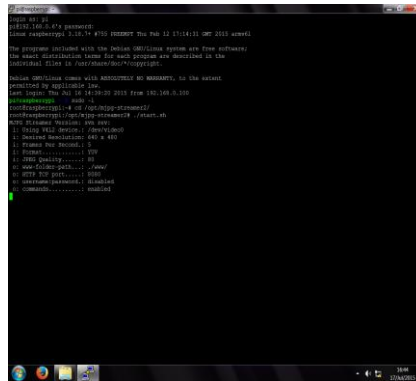


Fig2. Putty terminal

Enter the IP address, Port address and html page in web browser. Then we can monitor the video on the webpage as shown in fig 3.

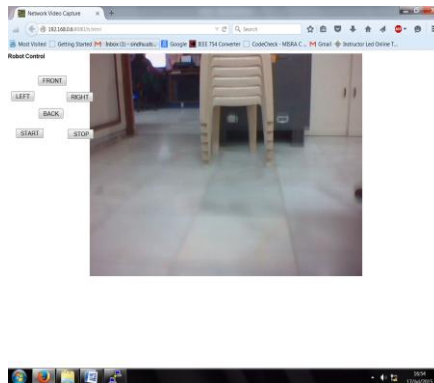


Fig3. Webpage

So by monitoring the video, the controlling of the robot according to the given directions can be done.

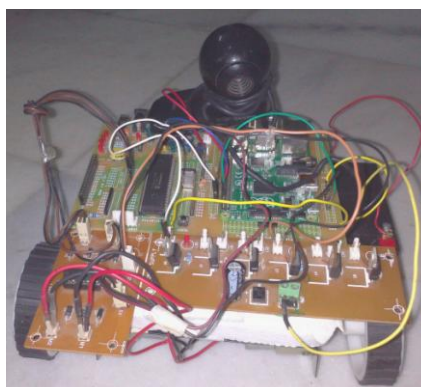


Fig4. Robot

## 5. CONCLUSION

Testing outcomes demonstrated that the human can navigate the RNR remotely over the Wi-Fi network by viewing the robotic environment from the robot's point of view and controlling it from a computer at the client side. The RNR can be controlled using the web-based control interface created if the client's control hardware specification is adequate to support live video streaming and with condition that wireless network coverage is available. The RNR can be restructured to run on more challenging terrain. Intelligence of the current prototype may also be extended through vision-based autonomous navigation and

Object recognition executed either on the server or the client.

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