

# Web based Remote Navigational Robot for Multiple Applications

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**Abstract:** In this paper, 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. Here the robot is a Multipurpose programmed robot. In this project a web based remote Video monitoring based navigation of Robot using ARM11 Platform. 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 and controls the robot, by using robot control unit. The robot also works as Obstacle avoider, Remote Controlled Pick & Place robot and also interfacing Temperature, obstacle sensor and metal detectors. Sensors data as well as robot controlling icons will be on the webpage, which get opened by entering IP address of our network. MJPG is a complete, cross-platform solution to record, convert and stream audio and video.

**Index Terms:** Remote navigational robot, Web camera, Wi-Fi, Sensors

## I. INTRODUCTION

Robots are being used in variety of industrial applications for various activities like pick and place, painting, assembling of subsystems and in hazardous places for material handling etc. Robots are becoming more and more intelligent as technology advances in the areas of CPU speed, sensors, memories etc. and there is ever demanding applications even in defense. With the rapid growth of the Internet, more and more intelligent devices or systems have been embedded into it for service, security and entertainment, including distributed computer systems, surveillance cameras, telescopes, manipulators and mobile robots. Although the notion of Internet robotics or web-based robotics is relatively new and still in its infancy, it has captured the huge interest of many researchers worldwide. robot is a virtual or mechanical artificial agent. In practice it is usually an electro-mechanical machine, which is guided by computer or electronic programming and is thus able to do tasks. Robots are outfitted with wide reaches and slim arms, steady repeatability and precise tooling-all, of which allows them to be extremely accurate. This high precision capability makes them a good match for pick and place application. Controlling robotic arm wirelessly is very helpful for a wide range of applications ranging from industrial to medical fields.

## II. SYSTEM STRUCTRE AND BLOCK DIAGRAM

Here we develop a robotic arm which should be controlled by an authorized person at any time and from any place using the web technology, the other through the web server which allows the client to access the robot from anywhere. Earlier we use human power for defusing the bomb and changing the cadmium rods in atomic power plant, which is very dangerous for human life and leads to the human hazard because developed suit for preventing the radiation of radioactive substances are not powerful and not prevent more than an hour. This leads to the less work efficiency and increases the risks. For avoiding this types of problem in the nuclear power plant. The additional features of this project are that the robot is controlled by web server. 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 in the world which saves the travel expenses and time.

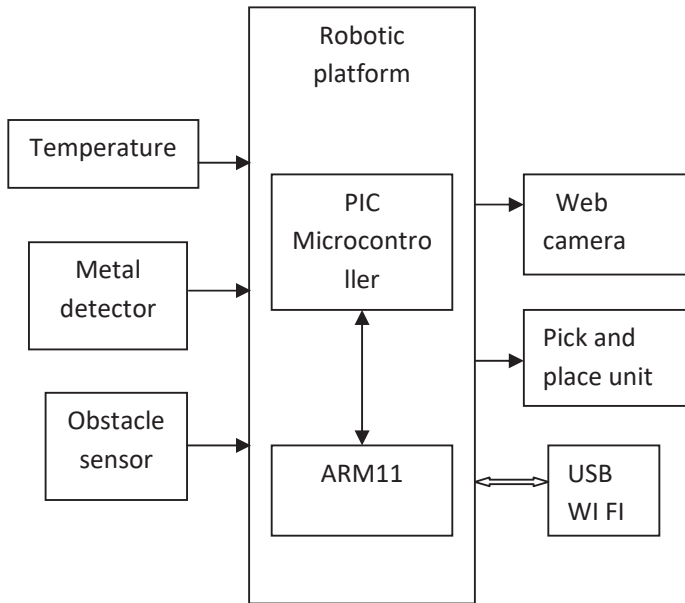


Fig.1: Block Diagram

Our robot uses its hands and picks the bomb and carries to safe place. If anything happen in between the replacement of bomb there will be no human hazard initiated .Our robot consists of DC geared motor which helps in smooth moving of hands and provides proper control on the robot movement.

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. The navigation of robot in different directions is controlled by Client. If the robot is moving in a place where temperature is more, if the temperature reaches more than 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. This project is developed for the helping of humans and reducing the risks of their lives

We should enter the IP address of the host and pass through the authentication process and then he can control the robot. The communication between Local system and client system has been communicated through web server. All the data are sent to the web server through local system and the clients can easily access the information from the server. WI-FI is mainly act as wireless communication between robot and the local system and uploads the data to the web server.

### III. SYSTEM HARDWARE

#### A. Raspberry Pi

The Raspberry Pi is a small, powerful and lightweight ARM based computer which can do many of the things a desktop PC can do. It is used for video processing and sending the processed video to user PC from the webpage. The webpage displays the video and contains the robot controlling icons including robo arm. The Raspberry Pi is based on a Broadcom BCM2835 chip.

#### B. Robot control unit: PIC18F452

Microchip manufacture a series of microcontrollers called PIC(Peripheral interface controller). A PIC microcontroller is a processor with built in memory and RAM and you can use it to control your projects (or

build projects around it). So it saves you building a circuit that has separate external RAM, ROM. Motors and sensors are being interfaced to PIC microcontroller.

#### *C.DC Motors L293D*

L293D are quadruple high-current half-H drivers. DC motors are being used for the movement of robotic wheels and stepper motor is used for camera movement i.e. for vertical movement and horizontal movement.

#### *D. Temperature Sensor (LM35)*

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. It is rated to operate over a -55° to +150°C temperature range.

#### *E. Obstacle Sensor (Infrared technology)*

Infrared light is part of the electromagnetic spectrum located just below the red portion of normal visible light – the opposite end to ultraviolet. Small infrared diode at the front of the remote beams out pulses of light at high speed to all of your equipment. When the equipment recognizes the signal as its own, it responds to the command.

#### *F. Metal detector*

Detects metal objects up to 7 cm giving active low output with LED indication & buzzer on detecting Metal. The heart of this sensor is the inductive oscillator circuit which monitors high frequency current loss in coil.

#### *G. Web Camera*

The images captured by the camera should be processed very fast to provide real time visualization of environment to the user. For this purpose along with low cost we think to use ARM The images captured by the camera should be processed very fast to provide real time visualization of environment to the user.

#### *H.PC*

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.

## IV. SOFTWARE IMPLEMENTATION

### *A. 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. It is designed to permit intermediate network elements to improve or enable communications between clients and servers.

### *B.HTML*

HTML is Hypertext Markup Language. It's a sort of coding system used for creating web pages. WebPages are written in HTML-a simple scripting language. HTML is short for Hypertext Markup Language. Hypertext is simply a piece of text that works as a link.

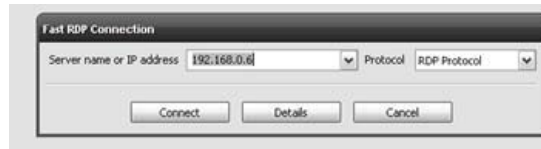
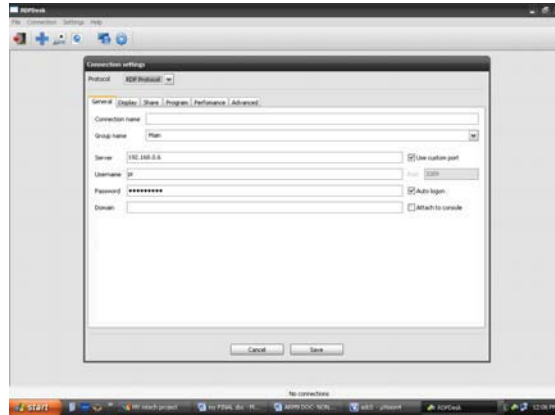
### *C.JPEG*

In computing jpeg, is a commonly used method of lossy compression for digital photography (image). The degree of compression can be adjusted, allowing a selectable tradeoff between storage size and image quality. JPEG typically achieves 10:1 compression with little perceptible loss in image quality.

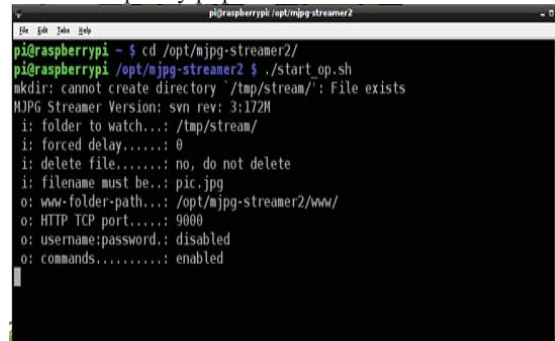
## V. DESIGN APPROACH

Enter into the Raspberry pi platform by entering the IP address of the board.

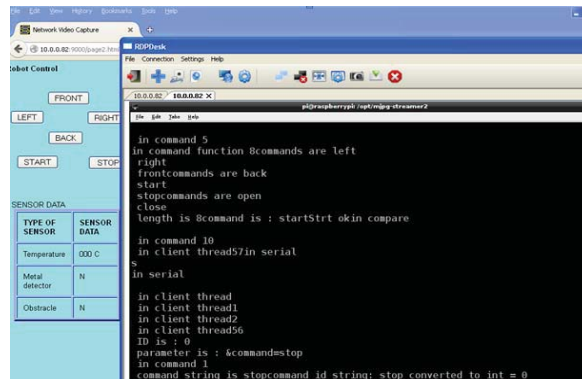
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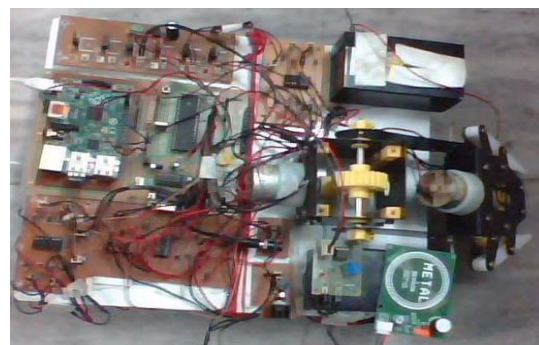
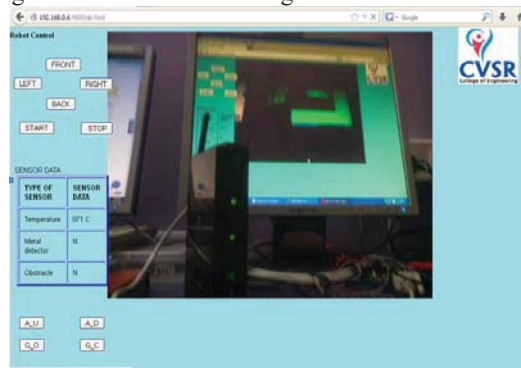
Running the script file in terminal of raspberry pi platform



Receiving commands from webpage:



Webpage with robot controlling icons and video streaming



## VI. RESULT AND CONCLUSION

The RNR can be controlled using the web-based control interface created if the client's control hardware specifications adequate to support live video streaming and with condition that wireless network coverage is available. 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. Currently, the prototype is suitable for navigation in indoor environment. The RNR can be restructured to run on more challenging terrain. More advance video streaming through compression can be employed to reduce bandwidth of video but that would require a main processor that can support video encoding for real-time streaming. 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.

## VII. ACKNOWLEDGMENT

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