

# WebIOPi- Remote Controlled Robot Cam Using Rest Framework

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## Abstract:

The objective of this paper is, we'll remotely control a Robot which has a webcam on it that's connected to a Raspberry Pi. The view from the Webcam can be seen remotely on any browser. Robot is controlled by a browser based interface through Wi-Fi module that can navigate the robot as well as get live video streaming from the camera attached to the robot

Keywords: Raspberry pi, Web Camera, Wi-Fi module, Robot, Wi-Fi Router

## I. INTRODUCTION

Making an IoT application using WebIOPi is very easy once we catch how it works and what is necessary. WebIOPi includes an HTTP server that provides both HTML resources and a REST API to control things. Browser will first load a HTML file, then the included JavaScript will make Asynchronous calls to the REST API to control and update the UI. This method is very efficient, because it don't need to refresh and download the whole page. WebIOPi is a REST framework which allows you to control Raspberry Pi's GPIO from a browser. It's written in JavaScript for the client and in Python for the server. We can fully customize and easily build your own web app. We can even use all the power of WebIOPi directly in your own Python script and register the functions so we can call them from the web app. WebIOPi also includes some other features like software PWM for all GPIO.

## II. HARDWARE DESCRIPTION

The system is constructed with Raspberry pi model b+ Figure1, Logitech USB web camera , Wifi-Router, Four wheeled Robot.

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and persistent storage.



Figure 1 : Raspberry pi B+

## III. SOFTWARE TOOLS

### IP Scanner

With Advanced IP Scanner, you can scan hundreds of IP addresses simultaneously at high speed. The software scans ports of network computers and finds HTTP,HTTPS,FTP and shared folders. Scan your network to get more information about all connected devices including computers names and MAC-addresses

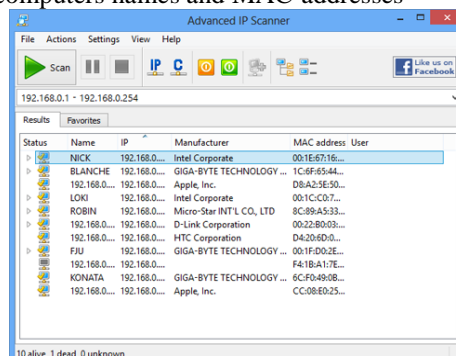


Figure 2: Advanced IP Scanner

## Putty

Putty is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin, and raw socket connection. The name "Putty" has no definitive meaning, though "ty" is the name for a terminal in the Unix tradition, usually held to be short for Teletype.

Putty was originally written for Microsoft Windows, but it has been ported to various other operating systems. Official ports are available for some Unix-like platforms, with work-in-progress ports to Classic Mac OS and Mac OS X, and unofficial ports have been contributed to platforms such as Symbian and Windows Mobile. Putty was written and is maintained primarily by Simon Tatham and is currently beta software.

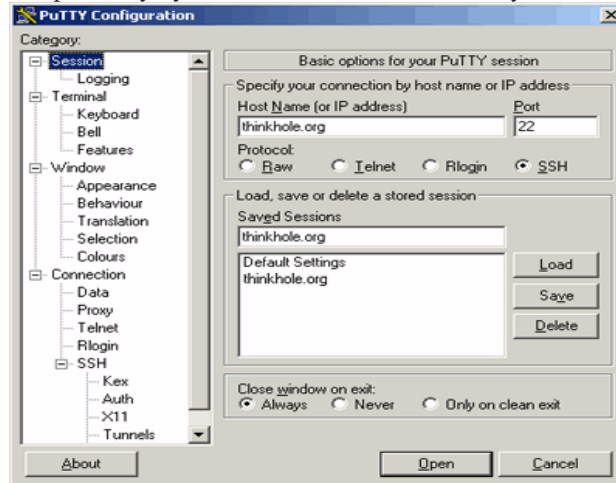


Figure 3: Putty configuration

## FileZilla

The FileZilla Wiki is a documentation base aimed at helping those that want to download, install, compile and use the FileZilla Client and FileZilla Server software to transfer files across the Internet.

File Zilla Client is a free, open source FTP client. It supports FTP, SFTP, and FTPS (FTP over SSL/TLS). The client is available under many platforms, binaries for Windows, Linux and Mac OS X are provided.

FileZilla Server is an FTP server supported by the same project. It supports FTP and FTP over SSL/TLS.

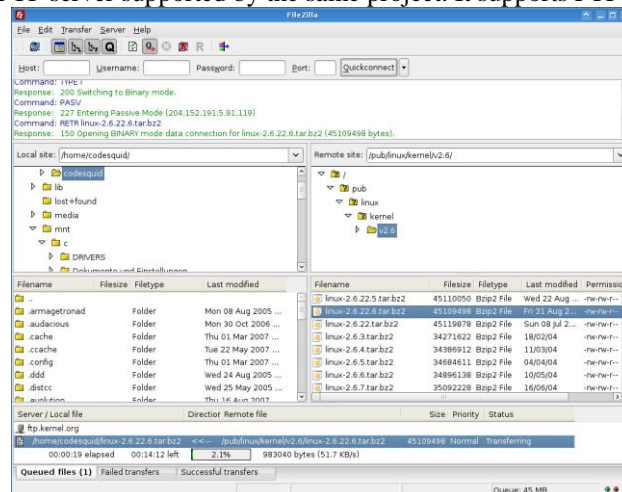


Figure 4: File Zilla

## MPEG streamer

To stream the webcam video using raspberry pi, mjpg-streamer should be the best option: <http://sourceforge.net/apps/mediawiki/mjpg-streamer>

In order to install it on your pi follow the steps:

1. Install subversion:

```
sudo apt-get update
```

```
sudo apt-get install subversion
```

2. Go to the folder where you want to have the mjpg-stremer, for example /home/pi

```
cd /home/pi
```

3. Get mjpg-streamer:

svn co https://mjpg-streamer.svn.sourceforge.net/svnroot/mjpg-streamer mjpg-streamer

4. Install libjpeg8-dev

```
sudo apt-get install libjpeg8-dev
```

5. Install ImageMagick

```
sudo apt-get install imagemagick
```

6. Make the project:

```
cd mjpg-streamer/mjpg-streamer  
make
```

7. When it finishes you should be ready to start streaming your video. To do so, enter the following command:

```
./mjpg_streamer -i "/input_uvc.so" -o "/output_http.so" -w "/www"
```

8. Now you should be able to view the stream from other computer on your network. Open a web browser and open the following link:

```
http://{name or IP-address of the Raspi}:8080
```

9. However, to let the stream be viewed from outside your network you will need to port forward your router. This varies from router to router, so please search on google how to do it on yours.

### Xming

Xming provides the X Window System display server, a set of traditional sample X applications and tools, and a set of fonts. It features support of several languages and has Mesa 3D, OpenGL, and GLX 3D graphics extensions capabilities. The Xming X server is based on Cygwin/X, the X.Org Server. It is cross-compiled on Linux with the MinGW compiler suite and the Pthreads-Win32 multi-threading library. Xming runs natively on Windows and does not need any third-party emulation software.

Xming may be used with implementations of Secure Shell (SSH) to securely forward X11 sessions from other computers. It supports Putty and *ssh.exe*, and comes with a version of Putty's *plink.exe*. The Xming project also offers a portable version of Putty.

The software has been recommended by authors of books on free software when a free X server is needed, and described as simple and easier to install though less configurable than other popular free choices like Cygwin/X.

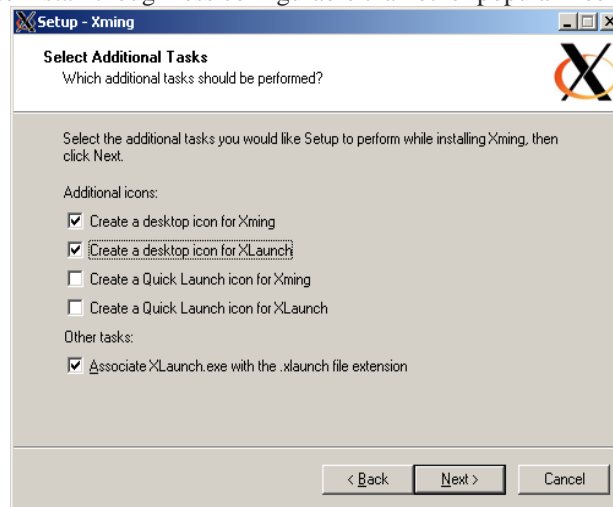


Figure 5: Xming

### Wicd Curses

Wicd is an open source wired and wireless network manager for Linux which aims to provide a simple interface to connect to networks with a wide variety of settings.

Some of Wicd's features include:

1. A full-featured interactive console interface and graphical interface
2. No required graphical dependencies (ie, no X, Gnome, KDE)
3. GTK interface has no GNOME dependencies, so it can be used in XFCE, Fluxbox, Openbox, Enlightenment, etc.
4. Ability to connect to wired (Ethernet only, no PPPoE/DSL support yet) and wireless networks
5. Profiles for each wireless network and wired network
6. Many encryption schemes, some of which include WEP/WPA/WPA2 (and you can add your own)
7. Remains compatible with wireless-tools
8. Tray icon showing network activity and signal strength

There are instructions for installing Wicd on Ubuntu, Debian, Arch, Fedora, Slackware, Gentoo and more on the downloads page, although it should work on any Linux distro.

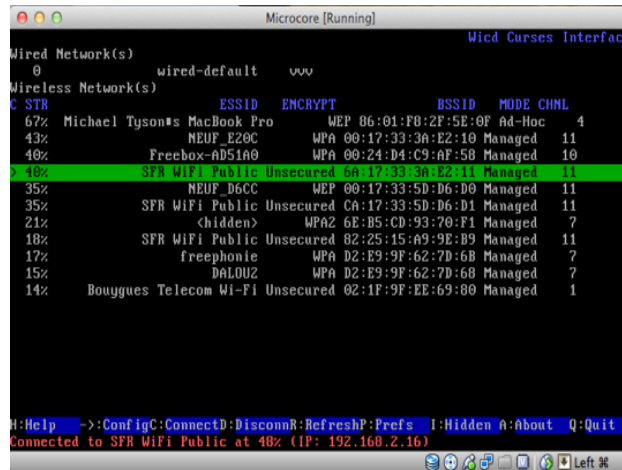


Figure 6: Wicd curses

### Win32disk imager

This program is designed to write a raw disk image to a removable device or backup a removable device to a raw image file. It is very useful for embedded development, namely Arm development projects (Android, Ubuntu on Arm, etc). Anyone is free to branch and modify this program. Patches are always welcome.

Warning: Issues have been reported when using to write to USB Floppy drives (and occasionally other USB devices, although very rare). It is highly recommended that before an image is written to a device, the user should do a Read to a temporary file first. If this fails, please report the failure along with your system information (file a new bug, NOT a review).

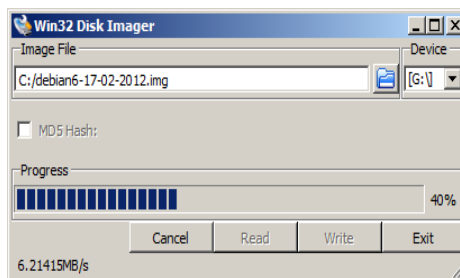


Figure 7: Win32 Disk Imager

## IV. PROPOSED SYSTEM

Figure 8 shows the block diagram of proposed system. A wi-fi adapter and usb camera is interfaced to raspberry pi and using web browser we are able to control the GPIO pins of the raspberry pi. So we can control motors through motor driver.

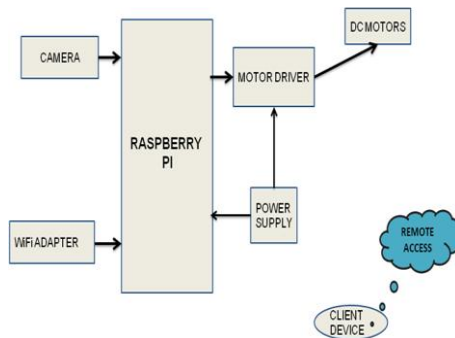


Figure 8 : Block diagram of proposed system

### IMPLEMENTATION OF THE SYSTEM

The html code which will be rendered by the pi as front end to the user as interface in the users browser when connected to the pi using the IP address as <http://localhost:8000>.

The python script which actually runs at the background, when we trigger any action in the html page, then the corresponding macro is identified in the python code and it is called and executed. The WebIOPi framework linkups the front end html and python at the back end by using macros.

### WORKING

The project sets out on working, when the pi gets booted up, automatically WebIOPi framework, mjpg-streamer and wicd-curses run as daemon process. That means they run as background applications automatically after start up.

We shall find the ip address of the Pi, by using ip scanner. Once we find the IP address, we can connect to the pi from any browser based device by using "localhost:8000" (default port of WebIOPi). As simple as that.

As we connect to the pi we get a browser interface through which bot can be navigated and controlled. We can also witness the live video streaming, output from the camera in the user page.

So this is how we can make the robot work and achieve our desired mission. As a prototype the robot is designed to meet all the characteristics as proposed. The robot has got few minor limitations but still they can't avoid the robot to be reliable and make it practically implementable.

## V. RESULTS

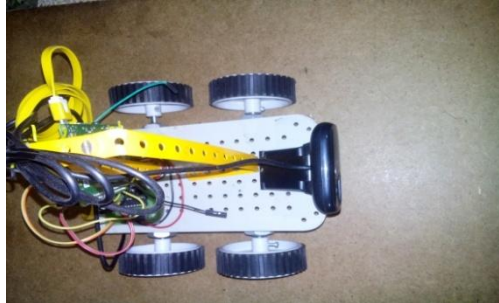


Figure 9: Hardware Setup

## VI. CONCLUSIONS

The main aim of the paper is to justify the name as it is web-controlled and Raspberry Pi based robot which can explore the unsafe or inaccessible surroundings and make us witness the live video stream and give us visual information. All the units say camera, Wi-Fi, motors, user interface(html), and the python program running at the back have been integrated using WebIOPi framework. This is how we can achieve to sight danger and inaccessible zones as simple.

## REFERENCES

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- [3] Usb camera retrieved from <http://www.raspberrypi.org/documentation/usage/webcams/>
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