# Using GadgetPC as a Remote Web Camera

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## Overview

GadgetPC is quite suitable for connecting various cameras and networking options to build your own camera system that can be used for security and remote monitoring systems. Unlike commercial web cameras that are restrictive in functionality, you can use GadgetPC to customize your own camera system. As an example, you can connect multiple web cameras to a single GadgetPC. Another useful option is to connect GadgetPC to a GPRS aircard or even to a solar panel for true remote monitoring at locations where power and/or network connection does not exist.

Unlike many commercial networked webcams that support only Internet Explorer when viewing camera images, a GadgetPC-based camera system works with virtually any browser. (Firefox, Safari, etc.)

#### Advantages:

- Low-power
- Support for multiple cameras
- Capability to run parallel applications such as web servers, file servers, and such while running camera
- Embedding camera images inside a web page on a web server running on the same GadgetPC

## Wired Ethernet

#### Parts Required

- 1 x GadgetPC
- 1 x ADP-5V1A-MiniUSB Power Adapter
- 1 x DUB-E100 Ethernet card
- 1 x Ethernet Cable
- 1 x USB Flash Drive to run Linux (optional)
- 1 x Webcam (see supported hardware)

Connect the various components as shown in *Figure 1*.

- The MiniUSB Power Adapter should be connected to a power source such as a computer or a USB to AC Adapter.
- The DUB-E100 Ethernet card should be connected to any one of GadgetPC's USB ports while the Ethernet cable is connected to a router or modem.
- The webcam should be connected to any one of GadgetPC's USB ports.



Figure 1.

# Software Setup

We need to edit the Linux vars.sh file to enable certain configuration options.

1) Open Linux Control Panel that comes with GadgetPC setup. (Start Menu -> All Programs -> GadgetPC -> Linux Control Panel)

	6	Accessories	•	25	Windows Messenger
	ĕ	Atmel AVR Tools	•	<b>31</b>	Visio 2000
	ĕ	ATMEL Corporation	•		
	ĕ	Brother HL-5250DN	•		
	ĕ	Dino Digital Microscope	•		
	õ	EAGLE Layout Editor 4.16r2	•		
	6	GadgetPC	Þ	Ē	Configure GadgetPC Linux
	m	Games	÷	1	Quick Start Guide
	6	GNUARM	•	0	Uninstall GadgetPC
🚳 Internet	6	Matrix Orbital	•	₩.	Linux Control Panel
Mozilla Firefox	6	MCS Electronics	•	E	Manually Configure GadgetPC Linux
F-mail	6	Micro-IDE	- <b>- -</b>		
Mozilla Thunder	6	Microsoft Office Tools	►		
	6	Mozilla Firefox	•		
SAM-BA v2.8	6	Mozilla Thunderbird	•		
	6	OpenOffice.org 2.4	•		
Micro-IDE	2	OpenOffice.org 3.1	►		
$\sim$	6	Skype	►		
S Skype	6	Startup	►		
~~~~	6	TightVNC	►		
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	2	Microsoft Access			
All Programs 🔸		Microsoft Excel			
	8	Microsoft FrontPage			
	C	Microsoft Outlook			
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2) Click File -> Open. By default, program will start from folder where GadgetPC was installed. Go to **sh** folder and select **vars.sh** file.

Open					? 🔀
Look jn:	🗀 sh		•	(† 🔁 🖶	
My Recent Documents Desktop My Documents My Computer	<ul> <li>ftp_server.sh</li> <li>init_at91sam_a</li> <li>init_dlink_usb_t</li> <li>init_dlink_usb_t</li> <li>init_dlink_usb_t</li> <li>init_dlink_usb_t</li> <li>init_ftdi_usb_st</li> <li>init_ftdi_usb_st</li> <li>init_ftdi_usb_st</li> <li>init_gspca_usb_t</li> <li>init_i2c_pcf857</li> <li>init_i2c_pcf857</li> <li>init_microsd.sh</li> <li>init_ports.sh</li> <li>mail_agent.sh</li> <li>motion_server.sh</li> </ul>	idc.sh eth.sh wifi.sh erial.sh _webcam.sh 4.sh	<ul> <li>spca_video_serve</li> <li>ssh_server.sh</li> <li>system.sh</li> <li>telnet_server.sh</li> <li>usb_utils.sh</li> <li>user_cmds.sh</li> <li>web_server.sh</li> </ul>	r.sh Type: UNIX Shell [ Date Modified: 6/3 Size: 2.40 KB	Document 30/2009 2:12 PM
<b>S</b>	File <u>n</u> ame:	vars.sh		•	<u>O</u> pen
My Network Places	Files of <u>type</u> :	Unix Shell fi	iles (*.sh) voad only	•	Cancel
		i open as	Tean-ouià		



3) Double-click **Hardware and Peripherals** and enable **DUB-E100** (Turned ON) and **GSPCA USB web camera** (Turned ON).

٧.	ariables Dialog	×
_		
	Network	
	DM9161A Ethernet adapter	OFF
	D-Link DUB-E100 Ethernet Adapter	ON
	D-Link WUA-1340 USB Wi-Fi adapter	OFF
	Sierra Compass855 AirCard USB Modem	OFF
	1/O Subsystem	
	FTDI USB serial adapter	OFF
	PCF857412C Controller on MINI-MAX/ARM9 Series Boards	OFF
	Initialize unused I/O ports on the hardware	YES
	Peripherals	
	GSPCA USB web camera	ON
	ADC hardware on MINI-MAX/ARM9 Series Boards	OFF
	Mount MicroSD	NO
	USB to SERIAL generic adapter	OFF
	Vendor code for USB to SERIAL generic adapter	0x12d1
	Product code for USB to SERIAL generic adapter	0x1001

4) Double-click **Network** and assign an IP address, subnet mask, and gateway IP address under **TCP/IP Options**.

٦V	ariables Dialog	>				
_						
	GPRS Connection	<u> </u>				
	Start Life;) GPRS Internet Connection	NO				
	Send PIN code to unlock SIM card in GPRS modem	NO				
	PIN code of SIM card	1111				
	GPRS device name	/dev/ttyUSB3				
	Delay before sending PIN (in seconds)	3				
	Delay for registration modem on GPRS network (in seconds)	15				
	Delay before start PPP service (in seconds)	3				
	Network					
	Key for Wi-Fi network interface	1237489567				
	SSID for Wi-Fi network interface	DLinkRouter				
	Install PPP	NO				
	TCP/IP Options					
	IP Address of Device	192.168.1.210				
	Subnet Mask	255.255.255.0				
	IP Address of Gateway	192.168.1.254				
	3G Connection					
	Start People.Net 3G Internect Connection	NO				
	Delay before start 3G connection (in seconds)	45				
	Delay after start 3G connection (in seconds)	3				
	3G device name	/dev/ttyUSB0				
	DynDNS					
	Username for dyndns.org account	GadgetPC				
	Pasword for dyndns.org account	gadgetpcpassword				
	Update period (in milliseconds)	600000				
	Alias for the host	gpcgprs.dyndns.org				
	_ · · · · ···					

5) Double-click **System** and assign a root password.

	٧a	riables Dialog	
,			
	Ξ	Drivers	
		Source path of system drivers	/mnt/usb/drivers
		Destination path of system drivers	/lib/modules/2.6.24
	Ξ	System Users	
		Password for user root	newpassword

6) Save the **vars.sh** file.

**NOTE:** Every time you access **vars.sh** file, you either need to have a temporary copy on your computer so that you can replace the actual copy on the USB Flash Drive or remove the USB Flash Drive from the GadgetPC and insert the USB Flash Drive into the computer for direct editing.

7) Insert the USB Flash drive to GadgetPC.

8) Apply or cycle power to GadgetPC (Turn OFF/ON).

9) After about 30-45 seconds, Linux will boot up and GadgetPC will be ready to serve camera images.

#### 10) Start up Microsoft Telnet.

- Connect to the IP address you assigned in Step 4 by typing the following command:
  - open xxx.xxx.xxx (where xxx.xxx.xxx is your IP address you assigned to the GadgetPC)
- Sign in with your username and password (default username/password: root/newpassword).
- Initiate **servfox** by typing the following command:
  - nohup /mnt/usb/servfox/servfox -f -d /dev/video0 -s 640x480 -w 7070 &
    - § The dimensions of the webcam image can be adjusted by changing the value of 640 x 480 to desired value

🚽 Telnet 192.168.1.25



Now, there are three methods to view the camera image:

11a) Method 1: Run spcaview.exe

- Copy over spcaview.exe and SDL.dll into desired folder. -
- Create a temporary batch file. \_
  - o Create a new text file "temp.txt".
    - § Edit txt with notepad with the following lines:
      - spcaview -w xxx.xxx.xxx.7070 (where xxx.xxx.xxx.xxx is • your IP address)

📕 te	emp.t	xt - Notep	ad							
File	Edit	Format V	/iew	Help						
spc. pau:	avie se	w -w 19	2.10	68.1	.25:7070					

- Rename temp.txt to "temp.bat"
- Run "temp.bat"



11b) Method 2: Embedded browser view

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- Edit the file: \myweb\camera\index.htm
  - Change dimensions to match servfox dimensions (in our case 640 x 480).

📕 index.html - Notepad File Edit Format View Help <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"> ۵ <html> <head> <title>GadgetPC WEB camera</title> </head> <body> <center̈><h1>GadgetPC WEB camera </h1></center> <center> <<tr><applet codebase="." archive="JWebcamPlayer.jar" code="JWebcamPlayer.class" name="JWebcamPlayer" ID="JWebcamPlayer" align="center" width="640" height="480" MAYSCRIPT> <param name="Color" value="#ffffff"> <param name="Color" value="#ffffff"> <param name="Color" value="127.0.0.1"> <param name="Server" value="127.0.0.1"> <param name="Server" value="7070"> <PARAM NAME="scriptable" value="true"> <PARAM NAME="scriptable" value="true"> <strong>You need to download Java.<br> Click <a href="http://www.java.com/en/download/manual.jsp">here: http://www.java.com/en/download/manual.jsp">here: http://www.java.com/en/download/manual.jsp">here: http://www.java.com/en/download/manual.jsp <∕/tď> </center> <center> click on the window surface to set brightness and contrast <br>
when done, click again to remove the control box.</center> </body> </html>

- Save the file.
- **Reminder: servfox** should be still be running; if you had to reboot Linux or remove the USB Flash Drive to edit files, repeat Step 8.
- Open up an internet browser that is connected to the same network as GadgetPC.
  - Type the url: <u>http://xxx.xxx.xxx/camera/index.htm</u> (where xxx.xxx.xxx is your IP address)

🍪 GadgetPC WEB camera - Mozilla Firefox		_ 8 ×
<u>File Edit View History Bookmarks Tools Help</u>		
C X 🟠 http://192.168.1.25/camera/index.html	☆ • Google	P
🙍 Most Visited 🐢 Getting Started 🔝 Latest Headlines		

GadgetPC WEB camera



11c) Motion Capturing: Saving pictures

- Open Linux Control Panel
  Select vars.sh again
  Click on the Software Icon

- Enable Motion Server \_

Yariables Dialog						
SPCA Video Server						
Run SPCA Video Server	NO					
Telnet Server						
Run Telnet Server	YES					
USB Utilities						
Create links to support USB utilities	YES					
Web HTTP Server						
Run Web HTTP Server	YES					
Path to configuration file	/mnt/usb/httpd/httpd.conf					
HTTP port	80					
Motion Server						
Run Motion Server	YES 🔹					
FTP Server						
Run FTP Server	YES					
FTP username	ftp					
FTP password	ftppassword					
Source path to configuration file for FTP server	/mnt/usb/vsftpd/vsftpd.conf					
OpenSSH Server						
Run OpenSSH Server	YES					
SSH username	sshd					
SSH password	sshdpassword					
Path to file with Host key for SSH	/mnt/usb/openssh/etc/ssh					
Path to file with DSA key for SSH	/mnt/usb/openssh/etc/ssh					
Path to file with RSA key for SSH	/mnt/usb/openssh/etc/ssh					
Path to configuration file for motion server	/mnt/usb/motion/etc/motion					
Open NTPD Server	· · · · · · · · · · · · · · · · · · ·					
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- Save the **vars.sh**.
- Insert USB Flash Drive into GadgetPC.
- As GadgetPC boots Linux, observe the LED on the webcam turn ON. If it does, then Motion Server is working and picture files are saved into **\motion\picture** folder located on the USB Flash Drive as JPEG images.
- The user may remove the USB Flash Drive and view their **Motion Captured** images on any Windows PC.

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🔟 02-20090709160523-00.jpg	17 KB JPEG Image	7/9/2009 4:05 PM	
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2003-07-03 16: 02:35-00

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## Wireless Ethernet

## Parts Required

- 1 x GadgetPC
- 1 x WUA-1340 Wi-Fi card
- 1 x USB Flash Drive to run Linux (optional)
- 1 x Webcam (see supported hardware)

Connect the various components as shown in Figure 2.

- The MiniUSB Power Adapter should be connected to a power source such as a computer or a USB to AC Adapter.
- The WUA-1340 Wi-Fi card should be connected to any one of GadgetPC's USB ports while the Ethernet cable is connected to a router or modem.
- The webcam should be connected to any one of GadgetPC's USB ports.



Figure 2.

1) Open **Linux Control Panel** that comes with GadgetPC setup. (Start menu -> All Programs -> GadgetPC -> Linux Control Panel)

	m	Accessories	•	3	Windows Messenger
	ĕ	Atmel AVR Tools		\$₽	Visio 2000
	õ	ATMEL Corporation	•		
	õ	Brother HL-5250DN	•		
	õ	Dino Digital Microscope	•		
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	m	Games	•	Å.	Quick Start Guide
	6	GNUARM	+ (	8	Uninstall GadgetPC
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Mozilla Thunder	6	Microsoft Office Tools	•		
	6	Mozilla Firefox	•		
SAM-BA v2.8	6	Mozilla Thunderbird	•		
	6	OpenOffice.org 2.4	•		
Micro-IDE	2	OpenOffice.org 3.1	•		
$\sim$	6	Skype	•		
S Skype	6	Startup	•		
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emp	•	Yahoo! Messenger	•		
Notepad	٨	Acrobat.com			
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	2	Microsoft Access			
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File View Help	
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2) Click File -> Open. By default, program will start from folder where GadgetPC was installed. Go to **sh** folder and select **vars.sh** file.

Open					? 🔀
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3) Double-click **Hardware and Peripherals** and enable **WUA-1340** (Turned ON) and **GSPCA USB web camera** (Turned ON).

-

4) Double-click **Network** and type in your **SSID** and **Key** under **Network** for your Wi-Fi interface.

	ariables Dialog		
Ξ	GPRS Connection		
	Start Life;) GPRS Internet Connection	NO	
	Send PIN code to unlock SIM card in GPRS modem	NO	
	PIN code of SIM card	1111	
	GPRS device name	/dev/ttyUSB3	
	Delay before sending PIN (in seconds)	3	
	Delay for registration modem on GPRS network (in seconds)	15	
	Delay before start PPP service (in seconds)	3	
Ξ	Network		
	Key for Wi-Fi network interface		
	SSID for Wi-Fi network interface	bipom	
	Install PPP	NO	
Ξ	TCP/IP Options		
	IP Address of Device	192.168.1.25	
	Subnet Mask	255.255.255.0	
	IP Address of Gateway	192.168.1.254	
Ξ	3G Connection		
	Start People.Net 3G Internect Connection	NO	
	Delay before start 3G connection (in seconds)	45	
	Delay after start 3G connection (in seconds)	3	
	3G device name	/dev/ttyUSB0	
Ξ	DynDNS		
	Username for dyndns.org account	GadgetPC	
	Pasword for dyndns.org account	gadgetpcpassword	
	Update period (in milliseconds)	600000	
	Alias for the host	gpcgprs.dyndns.org	

The rest of the setup is identical to the steps under **Wired Ethernet**. (Please refer to Steps 4-11 under **Wired Ethernet**).

## **Aircard GPRS**

## Parts Required

- 1 x GadgetPC
- 1 x Sierra Wireless Compass Aircard
- 1 x SIM Card with Data Plan
- 1 x USB Flash Drive to run Linux (optional)
- 1 x Webcam (see supported hardware)

Connect the various components as shown in Figure 3.

- The MiniUSB Power Adapter should be connected to a power source such as a computer or a USB to AC Adapter.
- The Sierra Wireless Compass card should be connected to any one of GadgetPC's USB ports while the Ethernet cable is connected to a router or modem.
- The webcam should be connected to any one of GadgetPC's USB ports.



Figure 3.

Insert your SIM card into the Aircard. SIM card should have data service (voice only SIM cards will not serve the purpose).

1) Open **Linux Control Panel** that comes with GadgetPC setup. (Start menu -> All Programs -> GadgetPC -> Linux Control Panel)



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2) Click File -> Open. By default, program will start from folder where GadgetPC was installed. Go to **sh** folder and select **vars.sh** file.

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My Network Places	File <u>n</u> ame: Files of <u>t</u> ype:	vars.sh Unix Shell fi Dpen as	les (*.sh) read-only	•	<u>O</u> pen Cancel



3) Double-click Hardware and Peripherals and enable Sierra Compass Aircard (Turned ON), GSPCA USB web camera (Turned ON), and USB to Serial generic adapter (Turned ON).

<b></b> V	ariables Dialog	×
	Network	
	DM9161A Ethernet adapter	OFF
	D-Link DUB-E100 Ethernet Adapter	OFF
	D-Link WUA-1340 USB Wi-Fi adapter	OFF
	Sierra Compass855 AirCard USB Modem	ON
	I/O Subsystem	
	FTDI USB serial adapter	OFF
	PCF8574 I2C Controller on MINI-MAX/ARM9 Series Boards	OFF
	Initialize unused I/O ports on the hardware	YES
	Peripherals	
	GSPCA USB web camera	ON
	ADC hardware on MINI-MAX/ARM9 Series Boards	OFF
	Mount MicroSD	NO
	USB to SERIAL generic adapter	ON
	Vendor code for USB to SERIAL generic adapter	0x12d1
	Product code for USB to SERIAL generic adapter	0x1001
		OK Cancel

4) Double-click **Network** and enable **Install PPP** (Turned ON) and assign an IP address, subnet mask, and gateway IP address under **TCP/IP Options**.

Yariables Dialog					
	Network				
	Install PPP	YES			
	GPRS Connection				
	Start Life;) GPRS Internet Connection	NO			
	Send PIN code to unlock SIM card in GPRS modem	NO			
	PIN code of SIM card	1111			
	GPRS device name	/dev/ttyUSB3			
	Delay before sending PIN (in seconds)	3			
	Delay for registration modem on GPRS network (in seconds)	15			
	Delay before start PPP service (in seconds)	3			
	TCP/IP Options				
	IP Address of Device	192.168.1.210			
	Subnet Mask	255.255.255.0			
	IP Address of Gateway	192.168.1.254			
	3G Connection				
	Start People.Net 3G Internect Connection	NO			
	Delay before start 3G connection (in seconds)	45			
	Delay after start 3G connection (in seconds)	3			
	3G device name	/dev/ttyUSB0			
	DynDNS				
	Username for dyndns.org account	GadgetPC			
	Pasword for dyndns.org account	gadgetpcpassword			
	Update period (in milliseconds)	600000			
	Alias for the host	gpcgprs.dyndns.org			
	Path to logging file	/mnt/usb/inadyn/log/inadyn.log			