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# Motion JPEG Streaming Server



Ragheed Al-Tayeb, 23 Apr 2012

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Implementing a **MJPEG** (or Motion JPEG) streaming server that can be used to steam screenshots or any other source of images over the HTTP protocol to any web browser client (**MJPEG** stream writer is included in the library).

features

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For mobile clients:

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Other clients (such as Firefox, Chrome and VLC player):



# Introduction

Motion JPEG is a stream of JPG images over HTTP protocol and it is commonly used for many multimedia applications specially in digital cameras (IP cameras). Although there are many ways to send images as a video to any remote computer **MJPEG** is the preferred one since normally it does not need any client software to be installed in the remote computer! that is because it is supported by most of the common web browsers like Firefox and Chrome but unfortunately, it is not yet supported by Internet Explorer directly (but there are some plug-ins that make it possible to work with IE).

# Motivation

In many I needed to stream a video of my desktop, camera, or whatever to a remote computer which has no client software to see my stream... In such a case, using Motion-JPEG streams is preferred because it needs no more than an internet browser. In this article I'm not going to describe the internal structure of an **MJPEG** stream (for more information, please visit Motion\_JPEG) instead of that I'm going to describe how to use this library for **MJPEG** streaming.

# How to use this library

The main class in our library is <a href="ImageSreamingSever">ImageSreamingSever</a>() which contains the following methods and properties:

#### **Methods:**

- void Start(): Starts the server on a specified TCP port.
- void Stop(): Stops the server and closes any open connections.

### **Properties:**

- ImagesSource: The images collection (IEnumerable < Image >) to be streamed to any connected client.
- Interval: The delay time (in milliseconds) between each sending image from the ImagesSource collection.
- IsRunning: Is a read-only bool property indicating the status of the server.
- Clients: Returns a read-only collection of the currently connected socket of each client.

### **Example:**

In order to implement a streaming server that can send a video of your desktop screen to any connected client, **you'll need only two lines of code** using our **ImageStreamingServer**, as follow:

```
☐ Collapse | Copy Code

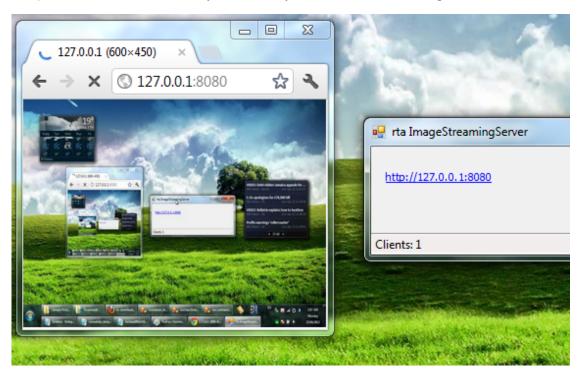
ImageStreamingServer server = new ImageStreamingServer();
server.Start(8080);
```

That's it !!!...

Now if you open (for example) the chrome internet explorer and write the IP of the server followed by colon and then the port number, in our example it is something like this:

http://127.0.0.1:8080

you will properly see a video of your computer screen in the explorer .. and same if you do this from another computer (with the correct IP of your server), you should see something like this :



# Implementing your own ImagesSource

Actually I've chosen <code>IEnumerable<Image></code> as a source of images because of the flexibility that this interface is providing, for example the default <code>ImagesSource</code> property of the class <code>ImageStreamingServer</code> is an <code>IEnumerable<Image></code> of the desktop screen, but at the same time you are free to implement any other type of image source you like by changing the value of that property.

Suppose you want to make the images source from the camera or from the images file of any folder in your computer, then your code should be something like this:

☐ Collapse | Copy Code

```
IEnumerable<Image> CameraImagesSource()
{
    // Your code must be here
}

IEnumerable<Image> FolderImagesSource(string path)
{
    // Your code must be here
}
```

As a real example, let's implement a source of images that streams all "\*.jpg" photos from a specified folder path as follows:

```
private IEnumerable<Image> FolderImagesSource(string path)
{
    var files = System.IO.Directory.GetFiles(path, "*.jpg");
    foreach (var file in files)
        yield return Image.FromFile(file);

    yield break;
}

private void Form1_Load(object sender, EventArgs e)
{
    var source = FolderImagesSource(@"C:\Pictures\");
    _Server = new ImageStreamingServer();
    _Server.ImagesSource = source;
    _Server.Start(8080);
}
```

Note: the above code can be shortened as follows (thanks for IEnumerable extensions and LINQ):

```
var source = System.IO.Directory.GetFiles(@"C:\Pictures\", "*.jpg").Select(s => Image.FromFile(s));

_Server = new ImageStreamingServer(source);
_Server.Start(8080);
```

# Supported client software

To see the streaming video of our server, you will need to use any software that supports Motion-JPEG streaming

such as a Mozilla Firefox, Google's Chrome or VideoLAN Player (VLC):



And finally for your mobile (android) use FireFox or any other free app that can be found on Google's market such as *tinyCamMonitor* (that was used in the picture below):



# Future versions

In the future versions of the library I'm going to add a variety of images sources such as:

- Images from a specific region of the screen.
- Images from a specific window in the system.
- Streaming images from a camera.
- All photos from any folder in a disk.
- And any other suggested sources of images you may want !? ...

And till that time, fill free to enjoy this version <sup>(2)</sup>



## License

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## About the Author



Ragheed Al-Tayeb

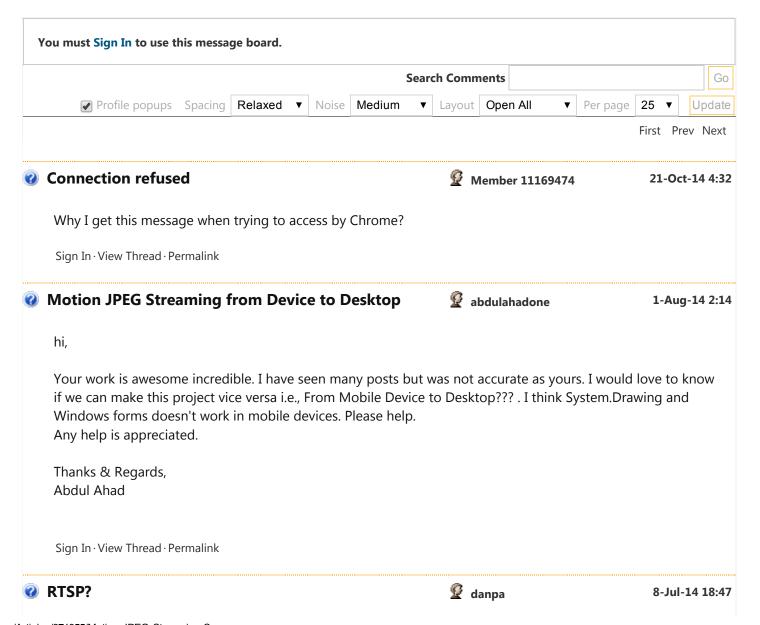
Team Leader Hawk International for Finance & Construction Ltd.

Yemen ==

Bachelor degree of Computer Sciences, Software developer using .NET (Visual Basic & C#). I like the development of an Artificial Intelligence Systems, GPS Applications, GDI+, APIs, N-Tier Applications, Distributed Systems and Network Monitoring Systems.

Mobile Development (Windows Mobile & Android).

## Comments and Discussions



Is this a RTSP protocol?? Is there a RTSP version?? Sign In · View Thread · Permalink Re: RTSP? **g** danpa 10-Jul-14 20:38 One more question... How to monitor and setup the output stream bitrate while I need 8Mb for testing? Sign In · View Thread · Permalink Re: RTSP? 🔹 jfriedman 13-Dec-14 3:36 Managed Media Aggregation using Rtsp and Rtp[^] Https://net7mma.codeplex.com Sign In · View Thread · Permalink **Stream mjpeg from IP camera** 🙎 Isamijn 20-Apr-14 23:11 Dear, i really thing this article is very good and is perfect what i'm looking for more than 2 months. but i'm very new to programming (some VB experiance). Can you help me on the way to change te code for steaming for a MJPEG stream of an IP camera and not the desktop? any help is very appriciated. Best regards.





15-Apr-14 0:37

Hello,

i want to broadcast video over internet. i tried with local machine and tried to access url over Internet but it is not working. in LAN its working fine.

Can you Please reply for above issue.

Regards & Thanks.

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## Can others see my screen?



6-Mar-14 14:56

Hi, please tell me when i instal this program can others see my screen ..something like teamviewer but without remote control ??

I tried it .. but it didnt work

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### How to run the ImageStreamingServer on a website



15-Feb-14 5:03

Hi Ragheed,

I have a website and I want to integrate your fantastic work on it so that clients can see a live video streaming from an IP camera.

My question is how to run the ImageStreamingServer on a website and get stream from an home IP Camera.

Any help is welcome.

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## **Re:** How to run the ImageStreamingServer on a



27-Feb-14 19:33

#### website

You can just stream from your camera. How to do this has been described earlier. Also, you can find great article about work with camera on this site. But you will need a relay server and a player in the browser.

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5-Mar-14 6:31

Hi there, thank you very much for your reply.

Could you please explain the relay server and player? How to configure them?

I have an IP Camera and am trying to make it work but it seems that I have to do the Internet router seeting which is really confusing to me.

I highly appreciate your help and time.

Thank you again. 🥯

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"I Am Making Software To Remote Other Desktop
And I Am Get Help Of Your Rtavideostreamer Code Of
C#, I Implement It Successfully Without Error But I
Get Client Count Is 0 Then What I Do....Please...":

Member 10527105

17-Jan-14 19:14

"I Am Making Software To Remote Other Desktop And I Am Get Help Of Your Rtavideostreamer Code Of C# , I Implement It Successfully Without Error But I Get Client Count Is 0 Then What I Do....Please...":

Code of Form 1

```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
using rtaNetworking.Streaming;
using System.Net;
using System.IO;
namespace projectdemo
   public partial class Form1 : Form
       private ImageStreamingServer _Server;
       public Form1()
           InitializeComponent();
         this.linkLabel1.Text = string.Format("http://{0}:8080", Environment.MachineName );
           //this.linkLabel1.Text = "http://114.143.29.182:8080";
       private void Form1_Load(object sender, EventArgs e)
           Server = new ImageStreamingServer();
           Server.Start(8080);
       private DateTime time = DateTime.MinValue;
       private void timer1 Tick(object sender, EventArgs e)
           this.sts.Text = "Clients: " + count.ToString();
       private void linkLabel1_LinkClicked(object sender, LinkLabelLinkClickedEventArgs e)
           System.Diagnostics.Process.Start("chrome", this.linkLabel1.Text);
           MessageBox.Show("Connected");
Coad of ImageStreamingServer
using System;
```

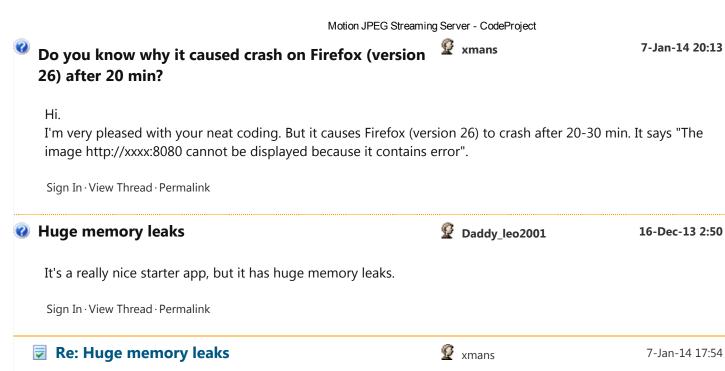
```
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Drawing;
using System.Net;
using System.Net.Sockets;
using System.Threading;
using System.Windows.Forms;
using System.IO;
namespace projectdemo
   public class ImageStreamingServer:IDisposable
        private List<Socket> _Clients;
        private Thread _Thread;
       public ImageStreamingServer():this(Screen.Snapshots(600,450,true))
       public ImageStreamingServer(IEnumerable<Image> imagesSource)
            _Clients = new List<Socket>();
            Thread = null;
            this.ImagesSource = imagesSource;
            this.Interval = 50;
        public IEnumerable<Image> ImagesSource { get; set; }
       public int Interval { get; set; }
        public IEnumerable<Socket> Clients { get { return _Clients; } }
        public bool IsRunning { get { return ( Thread != null && Thread.IsAlive); } }
        public void Start(int port)
            lock (this)
                _Thread = new Thread(new ParameterizedThreadStart(ServerThread));
                _Thread.IsBackground = true;
                _Thread.Start(port);
            }
```

```
public void Start()
            this.Start(8080);
       public void Stop()
            if (this.IsRunning)
                try
                    _Thread.Join();
                    _Thread.Abort();
                finally
                    lock (_Clients)
                        foreach (var s in _Clients)
                            try
                                s.Close();
                            catch { }
                        _Clients.Clear();
                    Thread = null;
        private void ServerThread(object state)
            try
                Socket Server = new Socket(AddressFamily.InterNetwork, SocketType.Stream,
ProtocolType.Tcp);
                Server.Bind(new IPEndPoint(IPAddress.Any,(int)state));
                Server.Listen(10);
                System.Diagnostics.Debug.WriteLine(string.Format("Server started on port {0}.",
```

```
state));
               foreach (Socket client in Server.IncommingConnectoins())
                   ThreadPool.QueueUserWorkItem(new WaitCallback(ClientThread), client);
            }
            catch { }
            this.Stop();
       private void ClientThread(object client)
            Socket socket = (Socket)client;
            System.Diagnostics.Debug.WriteLine(string.Format("New client from
{0}", socket.RemoteEndPoint.ToString()));
            lock (_Clients)
                Clients.Add(socket);
            try
                using (MjpegWriter wr = new MjpegWriter(new NetworkStream(socket, true)))
                    // Writes the response header to the client.
                   wr.WriteHeader();
                    // Streams the images from the source to the client.
                    foreach (var imgStream in Screen.Streams(this.ImagesSource))
                       if (this.Interval > 0)
                            Thread.Sleep(this.Interval);
                       wr.Write(imgStream);
                    }
            catch { }
            finally
                lock (_Clients)
                    _Clients.Remove(socket);
       }
       #region IDisposable Members
```

```
public void Dispose()
            this.Stop();
        #endregion
    static class SocketExtensions
        public static IEnumerable<Socket> IncommingConnectoins(this Socket server)
            while(true)
               yield return server.Accept();
       }
   }
    static class Screen
        public static IEnumerable<Image> Snapshots()
            return Screen.Snapshots(System.Windows.Forms.Screen.PrimaryScreen.Bounds.Width,
System.Windows.Forms.Screen.PrimaryScreen.Bounds.Height,true);
       public static IEnumerable<Image> Snapshots(int width,int height,bool showCursor)
            Size size = new Size(System.Windows.Forms.Screen.PrimaryScreen.Bounds.Width,
System.Windows.Forms.Screen.PrimaryScreen.Bounds.Height);
            Bitmap srcImage = new Bitmap(size.Width, size.Height);
            Graphics srcGraphics = Graphics.FromImage(srcImage);
            bool scaled = (width != size.Width || height != size.Height);
            Bitmap dstImage = srcImage;
            Graphics dstGraphics = srcGraphics;
            if(scaled)
                dstImage = new Bitmap(width, height);
                dstGraphics = Graphics.FromImage(dstImage);
            }
            Rectangle src = new Rectangle(0, 0, size.Width, size.Height);
            Rectangle dst = new Rectangle(0, 0, width, height);
            Size curSize = new Size(32, 32);
```

```
while (true)
        srcGraphics.CopyFromScreen(0, 0, 0, 0, size);
        if (showCursor)
            Cursors.Default.Draw(srcGraphics,new Rectangle(Cursor.Position,curSize));
        if (scaled)
            dstGraphics.DrawImage(srcImage, dst, src, GraphicsUnit.Pixel);
        yield return dstImage;
    }
    srcGraphics.Dispose();
   dstGraphics.Dispose();
    srcImage.Dispose();
    dstImage.Dispose();
    yield break;
internal static IEnumerable<MemoryStream> Streams(this IEnumerable<Image> source)
   MemoryStream ms = new MemoryStream();
    foreach (var img in source)
        ms.SetLength(0);
       img.Save(ms, System.Drawing.Imaging.ImageFormat.Jpeg);
        yield return ms;
    }
    ms.Close();
    ms = null;
    yield break;
```



Did you fix memory leaks?

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### NullReferenceExeption [modified]

**У** Андрей Корниенко

15-Dec-13 23:50

7-Jan-14 17:54

Hi!

I have a little problem with your code. I'm confused. When I call your code, project starts normally, but after some time, when I trying tipe some text into any window, like IM, app will be crashed and IDE show me point into Main method.

```
Application.EnableVisualStyles();
Application.SetCompatibleTextRenderingDefault(false);
Program.MainForm = new MainForm();
Application.Run(Program.MainForm); // here
```

I tried change attribute [STAThread] for [MTAThread], but it doesn't work.

And your code I use just like copy and paste. I change just namespace.

I have no idea, what need to say you more about my problem.

That's output of my program:

```
Server started on port 8080.
New client from 192.168.0.127:38396
System.Transactions Critical: 0 : <TraceRecord xmlns="http://schemas.microsoft.com/2004/10/E2ETraceEvent/TraceRecord"
Severity="Critical">
<TraceIdentifier>http://msdn.microsoft.com/TraceCodes/System/ActivityTracing/2004/07/Reliability/Exception/Unhandled</TraceIdentifier>
<Description>Heo6pa6oтaнное исключение</Description><AppDomain>ScreenBlocker.exe</AppDomain><Exception>
<ExceptionType>System.NullReferenceException, mscorlib, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089</ExceptionType><Message>B экземпляре объекта не задана ссылка на объект.</Message><StackTrace>
System.Windows.Forms.UnsafeNativeMethods.PeekMessage(MSG& msg, HandleRef hwnd, Int32 msgMin, Int32 msgMax, Int32 remove)
  В
System.Windows.Forms.Application.ComponentManager.System.Windows.Forms.UnsafeNativeMethods.IMsoComponentManager.FPushMessageLoop(Int32
dwComponentID, Int32 reason, Int32 pvLoopData)
  B System.Windows.Forms.Application.ThreadContext.RunMessageLoopInner(Int32 reason, ApplicationContext context)
  B System.Windows.Forms.Application.ThreadContext.RunMessageLoop(Int32 reason, ApplicationContext context)
  B System.Windows.Forms.Application.Run(Form mainForm)
  в ScreenBlocker.Program.Main(String[] args) в d:\SharpDevelop Projects\ScreenBlocker\ScreenBlocker\Program.cs:строка
30</StackTrace><ExceptionString>System.NullReferenceException: В экземпляре объекта не задана ссылка на объект.
  B System.Windows.Forms.UnsafeNativeMethods.PeekMessage(MSG& msg, HandleRef hwnd, Int32 msgMin, Int32 msgMax, Int32 remove)
System.Windows.Forms.Application.ComponentManager.System.Windows.Forms.UnsafeNativeMethods.IMsoComponentManager.FPushMessageLoop(Int32
dwComponentID, Int32 reason, Int32 pvLoopData)
  B System.Windows.Forms.Application.ThreadContext.RunMessageLoopInner(Int32 reason, ApplicationContext context)
  B System.Windows.Forms.Application.ThreadContext.RunMessageLoop(Int32 reason, ApplicationContext context)
  B System.Windows.Forms.Application.Run(Form mainForm)
  B ScreenBlocker.Program.Main(String[] args) в d:\SharpDevelop Projects\ScreenBlocker\ScreenBlocker\Program.cs:строка
30</ExceptionString></Exception></TraceRecord>
```

Have you any ideas, what's can be wrong with my code?

P. s. Ok. I really tired now.

How I can use that code with any other?

modified 16-Dec-13 8:24am.

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1.00/5 (1 vote)





2-Sep-13 3:54

Works-Super-Grade, but have a problem.

\_Server can't stop correctly





1-Sep-13 0:18

this project is best for me. but i use vb.net. i don't understand real thinks c# code. please for me, add example mp4 file stream in this project, please.

Note: please all code include your example.i convert to vb.net. thanks.

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### Great and succinct article! Need one more feature to **Great and Succinct article!** Need one more feature to **Great article!** make it perfect



22-Aug-13 17:06

Hi Ragheed,

I really love the simplicity of your project and it doesn't require extra client software in order to run it!!! It is platform independent!!!

Now, I just want to have one more feature.

How can you allow people from outside your home network to watch the M-JPEG stream?

This will be a killer feature if you could add it in.

I am looking forward to your reply.

Best regards,

Franya

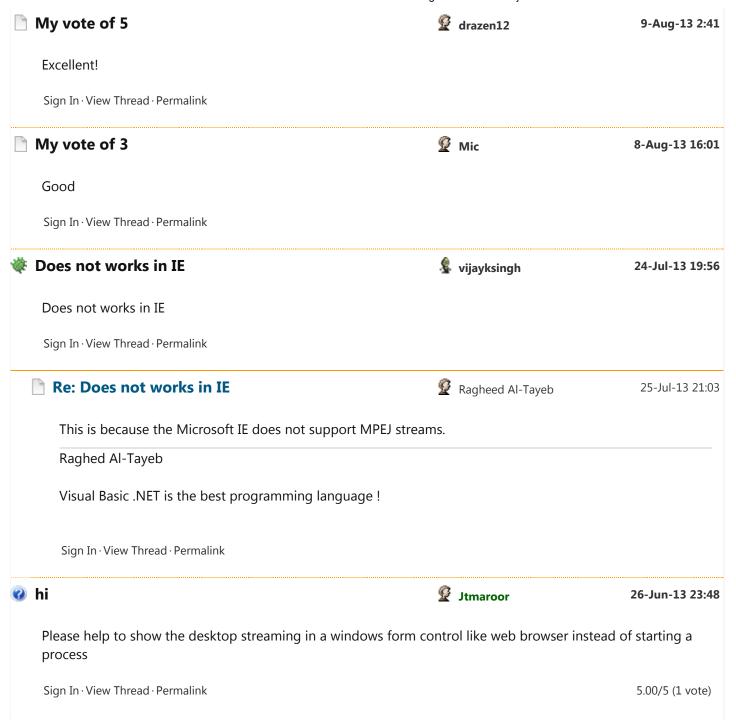
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## **Specific Window**



13-Aug-13 7:41

Hi, Do you have a working example of streaming a specific window? Very cool program btw



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