

## Android as a CCTV CAMERA Project

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**Abstract** - As the technology is advancing day by day, there are various alternatives occurring for the already present or previous technologies. This article suggests the working of an android phone as a spy or CCTV camera. The article gives a brief idea of various technologies or software being used to make an android phone as a CCTV camera.

### I. INTRODUCTION

Nowadays, surveillance is becoming important, so CCTV (closed circuit television) cameras are being used widely. CCTV cameras are a type of television system which is generally used for surveillance. CCTV cameras capture video signals and try to monitor it. CCTV cameras are generally very costly as it has various components—camera for viewing the area to be captured, wiring to connect it with the TV and other components, TV for viewing the streamed video. But for some purposes where surveillance is required only for homes, not at larger extent, like surveillance of the child sleeping in another room and working on the laptop in other room, then use of the CCTV camera shall not be desirable for this operation as it will cost high. Now surveillance is required not by using the regular CCTV cameras but by some cheaper means i.e. by using the things already present generally at homes. This paper is for this purpose. By having some small things in homes, surveillance at homes can easily be done. Only few things are required which are discussed later in this paper. The idea of using an android phone as a CCTV camera is discussed in this paper.

For using Android phone as a CCTV camera, few things are required. Obviously an android phone is needed for having at least one camera working either front camera or the rear one. A laptop is also needed with some software support which is described later in this paper. A router is also needed for serving as an interface between the android phone and laptop so the proper streaming will be provided from the android phone to the laptop.

Software technologies being used:

#### 1. Visual studio (Visual C#):

It is an integrated development environment (IDE) which is developed by Microsoft. It is used for various purposes –web application development, web services. It uses various platforms for working. It supports various languages such as C, C++, C#, F#, PYTHON, RUBY. It also supports XML, javascript, HTML, CSS etc.

#### 2. Basic4android:

It is a development tool for developing the android applications for various purposes. It is an alternative which is developed by anywhere software technologies to use instead of android studio. The applications formed can be checked by the android emulators or a real device (android phone) by using its feature of wireless debugging.



**Fig. 1.** Showing Android Phone as a CCTV camera positioned correctly by a handler.

### II. NETWORK PROGRAMMING

This is a type of programming technique in which multiple devices are connected to a single network for communication between these devices. There are various programming languages which allow us to use network programming for sharing of resources and information.

Generally there are two protocols used for this purpose.

1. TCP: TCP stands for Transmission Control Protocol. This protocol is connection –oriented and generally used for reliable communication between two devices.
2. UDP: UDP stands for User Datagram Protocol. It is a connectionless protocol.

### III. SOCKET PROGRAMMING

In socket programming, the communication is established using TCP protocol. Here the client establishes a socket on its end of communication and then tries to interface the socket with the server. After the connection is established, the server creates a object of socket on its own end. Now the server and the client is ready to communicate with each other using the Sockets by reading and writing to the Sockets.

### IV. PROBLEM DEFINITION

The project deals with the development of applications by which an old android phone can be used as a CCTV camera. So that it can be used to survey our rooms in home. It involves two applications one is for the android phone and the other for the laptop to which the streamed video will be provided.

### V. PROPOSED SYSTEM

To overcome the above difficulties an Android CCTV camera system has been developed that will provide us with the ability to use an android phone as a CCTV camera.

The project involves two applications one for the Android phone and the other for the laptop:

**Android Application:** This application is being created for sending the video frames captured from the Android phone to the server i.e. laptop. Also there are some other things in this application which fascinate the user like the effects while being streaming the video.

**Laptop/Desktop application:** This application is being created to use the laptop as a server which will receive the video frames coming from the android phone and provide a streamed video. Desktop can also be used for this purpose.

### VI. ARCHITECTURAL DIAGRAM

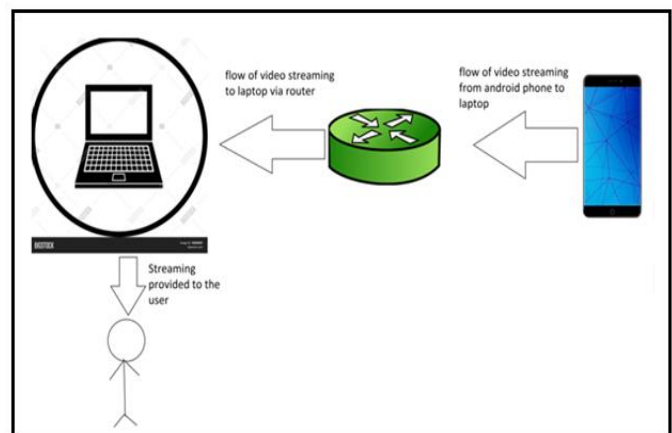


Fig. 2. Architectural Diagram

### VII. DATA FLOW DIAGRAMS

A Data Flow Diagram is a graphical tool used to describe and analyse the movement of data through a system –manual or automated including the processes, stores of data and delays in the system. There are central tools and basis from which other components are developed. It depicts the transformation of data from input to output through processes and interaction between processes.

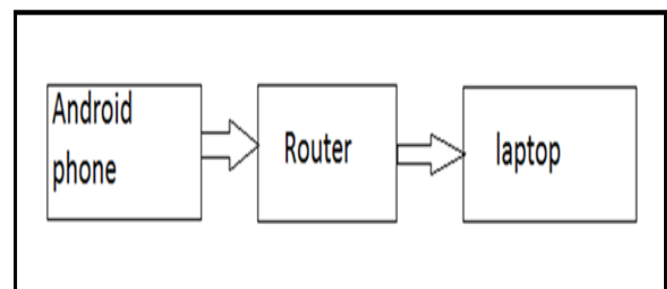


Fig. 3. Level 1 DFD

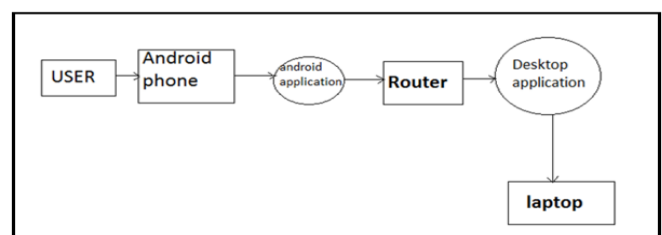


Fig. 4. Level 3 DFD

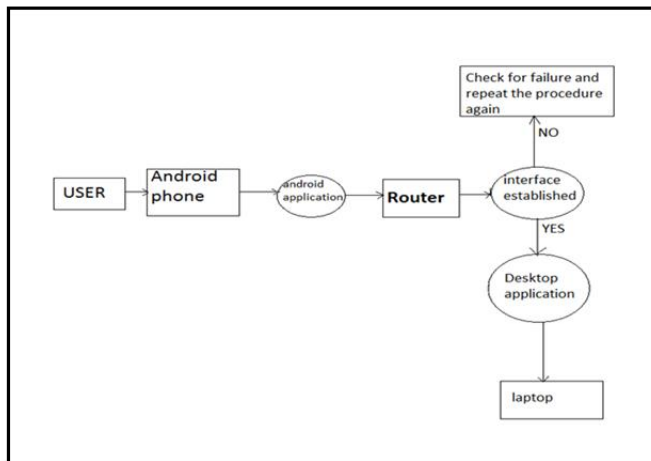


Fig. 5. Level 4 DFD

### VIII. METHODOLOGY

Firstly let's note the things we need to have for using Android phone as a CCTV camera. The first thing needed is an Android phone. Secondly, we need a laptop and a Router. If a router is not available, then another android phone can be used as router by using its hotspot facility. Also if a laptop is not available, then desktop can be used with a condition that it should be connected to the same router with the LAN cable. After fulfilling these conditions, you are ready to use your android phone as a CCTV camera. The software technologies needed are the visual studio (any version) to run on the laptop and basic4android software for just creating the application(apk file) for sending the video streaming from the android phone to the laptop. Now lets discuss about the overall system for working of an android phone as a CCTV camera

The overall system consists of mainly two subsystems. First is the client (nothing but the android phone) who will send the packets to machine and second is the server which collects the packets i.e. machine. Using basic4android, application is created for sending the packets from android phone to laptop or desktop. Here the android app will act as a client which will sent packets to the server. Note that the laptop and the android phone should be connected with the same wireless network. If they are not connected with the same wireless network, the interfacing will not happen between android phone and laptop, thus an error will be shown and no streaming will be provided to the machine from the android phone. Here the IP addresses play an important role. The wireless network (router) provides an IP address to the laptop and the android phone (different IP addresses). The interface will be created by entering the IP address of the laptop in the android phone application. Thus the connection will be

established between the android phone and the laptop.

Network port is also playing an important role here. Basically port is the point where the communication ends between two processes on different locations (Client and Server).

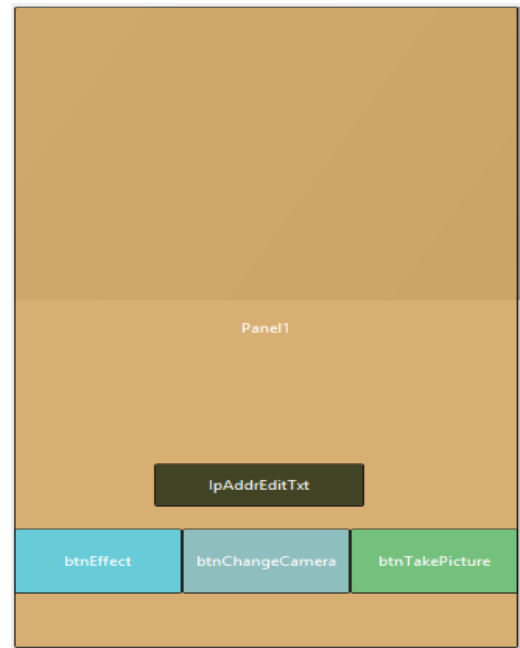
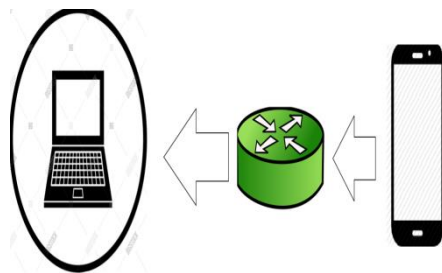


Fig. 6. Layout of the Android App running on android phone.

The Android app will have the camera activity which is constantly running being shown in previous figure. After the connection or interfacing is being made, the app will start sending the packets (video streaming) to the dedicated port on the laptop. By dedicated port we mean that we have decided a port on the laptop which should be used for the application of receiving the packets from the android phone. Note that the packets will reach the laptop via the wireless network which is provided using the router. The dedicated port on the laptop should be allowed to receive the incoming packets so that the video streaming will be provided to the laptop. This can be done by changing the incoming rules setting in the firewall settings of the control panel by creating a new inbound rule for the dedicated p[ort and also allow the setting option for incoming of packets from the android phone .All programming logic we are using is the socket programming as we are sending the packets from the android phone to a dedicated port on the laptop . Here the

client is the android phone which is using the socket object and tries to interface with the machine.

The figure shown below shows the direction of streaming of packets from the android phone to the laptop via wireless router. The biggest advantage of using android as a CCTV camera is that there is no wires needed for streaming so no cost is needed for the wires and no complexity takes place.

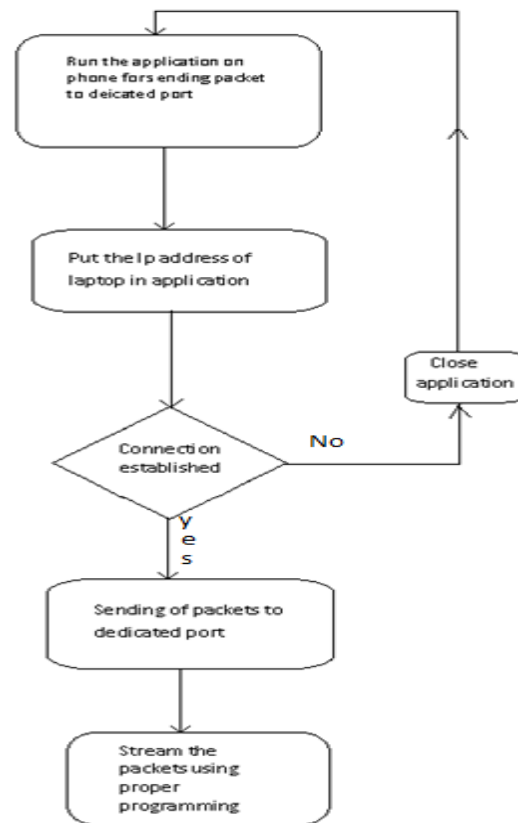


**Fig. 7.** Flow of video streaming from android phone to laptop via router

After the packets received to the dedicated port on the laptop, the work is now to make a listener which will listen to the packets received on the dedicated port.

This can be done using the `tcpllistener` class provided in `c#` for listening to the ports. This class will use the port no., IP address as its arguments. The flow chart of the whole procedure is shown below. As shown in the flowchart we have to first run the application APK in the android phone, the screenshot of the running application is shown on left side. Then enter the IP address of the laptop provided by the router in the application as shown in left side screenshot of the application of android phone. Then if the connection is not established then the message will be showing on the application as "Error Connecting," as shown on the screenshot. Then we have to again check for the connections whether the laptop is connected to the same wireless network and whether the IP address entered in the application of android phone is correct or not. After removing the errors, again start the application on the android phone and enter the correct IP address. Now if no error connecting message is displayed, then the connection is established and the application starts sending the packets from the android phone to the dedicate port on the laptop.

Now the work will start on the server side to stream the packets in the form of video from the dedicated port. Visual Studio is used for the purpose using `c#` language. There are classes which are being used for receiving the data from the port in `c#` language like `TCPlistener` class. This class has the ability of listening to the port data.



**Fig. 8.** Flowchart of working of Android as a CCTV camera.

**IX. FUTURE WORK**

In this project, same wireless network is being used for developing a connection between the phone and the laptop. We would like to develop a project which will work for developing a connection between the laptop and the phone by having different communication network. If this thing works then it will be possible to see the view of the video streaming of the phone on the laptop at some other location. Also we are thinking of streaming the sound with video from the android phone to the laptop and also using a streaming in the opposite direction from laptop to the android phone.

**X. CONCLUSION**

There are lot more things which we can do with the present technology by having the clear concepts about the technology. So, we can use the android phone as a CCTV camera by the transfer of packets from the android phone to the machine port via the wireless communication.

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