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Beaglebone Black Webcam Server For Security

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Abstract— Web server security using BeagleBone Black is based on ARM Cortex-A8 processor and Linux operating system is designed and implemented. In this project the server side consists of BeagleBone Black with angstrom OS and interfaced with webcam. The client can access the web server by proper authentication. The web server displays the web page forms like home, video, upload, settings and about. The home web page describes the functions of Web Pages. The video Web page displays the saved videos in the server and client can view or download the videos. The upload web page is used by the client to upload the files to server. The settings web page is used to change the username, password and date if needed. The about web page provides the description of the project.

Index Terms— BeagleBone Black, Angstrom OS (Linux), Web Server, PHP, HTML, PYTHON.

1 INTRODUCTION

A Web server uses the client/server model and the World Wide Web's Hypertext Transfer Protocol (HTTP), serves the files that form Web pages to Web users. Every computer on the Internet that contains a Web site must have a Web server program.

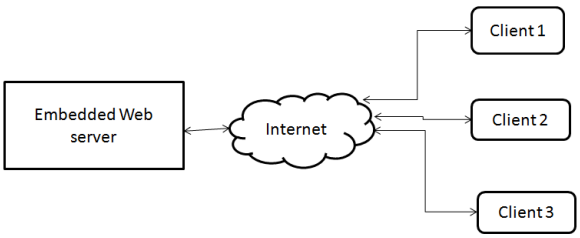

Fig. 1 Architecture of Embedded Web Server

A web server can be embedded into a device which can be accessed remotely from a web browser. This embedded system can serve the web documents on request by a client from other system. Such type of a web server is called as Embedded Web Server (EWS). A simple architecture of embedded server is shown in Fig.1. It consist of ARM processor that contains internet softwares PHP, HTML, PYTHON which suite for monitoring, controlling and remotely access the system.

The On-Board module consists of webcam, a HDMI monitor and BeagleBone Black. In this paper, Section II describes about the related works of various papers. Section III describes about system configuration of the proposed design. Section IV explains the various experimental results. Finally, Section V deals with the conclusion and future work.

2 RELATED WORKS

[1] ShubhangiS. Kose, Prof. Mrs. Jyoti M.Varvadekar et al., [2014] has proposed Application Development for Video Monitoring System & Motion Detection System using ARM9 Processor. [2]KavithaMamindla, Dr.V.Padmaja, CH.NagaDeepa et al., [2013] has proposed Embedded Real Time Video Monitoring System using Arm. [3]Akshada Deshmukh, Harshalata Wadaskar, Leena Zade, Neha Dhakate, Preetee Karmore et al., [2013] have proposed Webcam Based Intelligent Surveillance System. [4]SherinCherian, C.SenthilSingh et al., [2014] have proposed Real Time Implementation of Object Tracking through Webcam. [5]V. Ramya and B. Palaniappan et al., [2012], has proposed Web Based Embedded Robot for Safety and Security Applications Using Zigbee. [6]S. Panagiotakis, K. Kapetanakis, A. G. Malamos et al., [2013], have proposed Architecture for Real Time Communications over the Web. To overcome the drawbacks of the above existing system, a video streaming using BeagleBone Black is designed to download/upload the video with proper authentication.

3 PROPOSED SYSTEM DESIGN

The video streaming using BeagleBone Black consists of the webcam and inbuilt angstrom linux OS. The system can be remotely accessed using MobaXtem.

3.1 BLOCK DIAGRAM

The server consists of a power supply board, BeagleBone Black, webcam and a HDMI monitor is as shown in Fig.2. The server records all the videos using the webcam and the client can download the videos over the internet using proper authentication.

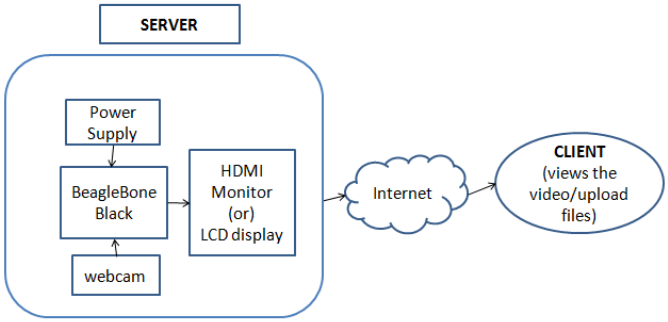

Fig.2. Block Diagram Of The System

3.2 BEAGLE BONE BLACK

The BeagleBone Black is a low cost expandable computer launched by Texas Instruments. It consists of a powerful TI Sitara ARM Cortex-A8 processor which runs at 1GHz and it has a 2GB on-board flash memory. It supports Linux Operating System such as Angstrom and Ubuntu. The BeagleBone Black consists of 512MB RAM and one USB port. It operates on four booting modes with led light indications. The BeagleBone Black A6 version is shown in Fig.3.

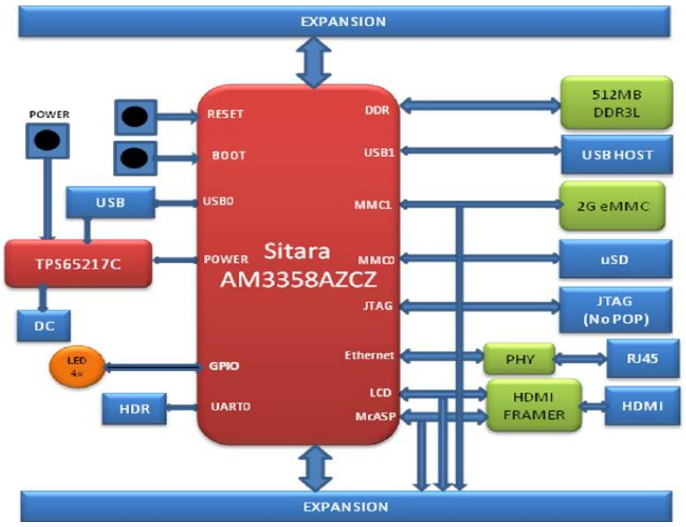

Fig.3. BeagleBone Black

3.3 WEB CAMERA

A webcam is a video camera that feeds its image in real time to a computer or computer network. In this project mercury webcam is used to capture the videos and save it in the BeagleBone Black.

3.4 LIGHTTPD

LIGHTTPD is an open-source web server. Using the IP address of the BeagleBone Black the client can access the web server. The web server requests the client for proper authentication and the web page form will be opened. The client also uploads the file using web server to the BeagleBone Black. In this project the LIGHTTPD is programmed with PHP and HTML.

3.5 PHP AND HTML

The PHP Hypertext Pre-processor (PHP) is a programming language that allows web developers to create dynamic content that interacts with databases. It is basically used for developing web based software applications and also to manage database, dynamic content, session tracking, even build entire e-commerce sites. PHP5 version was used in this project.

Hypertext Markup Language is the standard markup language used to create web pages. Html Form is embedded with PHP script to develop a home web page which contains the video, upload, settings and about web page forms.

3.6 FLOWPLAYER

FLOWPLAYER drive is used to play saved videos on the server. It is an open source player. It permits the client to view the videos in the web server.

3.7 CHEESE

Cheese is a GNOME webcam application. Cheese can record photos as well as videos and can use a timer before shooting as well as taking pictures in burst mode. The application has built-in sharing so that photos or videos can be uploaded to photo-sharing sites or can be viewed on a computer.

3.8 FFMPEG

FFMPEG is used in this project to save the videos in FLV format. The client can download the saved videos and view in his system.

3.9 SOFTWARE- ALGORITHM

The software algorithm of video streaming using BeagleBone Black is described below.

ALGORITHM:

Step 1 : Videos are stored in server using webcam.
Step 2 : Initialize IP address in client system.
Step 3 : Verification of authentication.
Step 4 : Viewing of Home page.
Step 5 : Selecting the video page to download the saved videos.
Step 6 : Selecting the upload page to upload the files.
Step 7 : Selecting the settings page to change the username, password etc.
Step 8 : Selecting the about page to study the description.

4 EXPERIMENTAL RESULTS

4.1 HARDWARE SETUP

The webcam is interfaced with BeagleBone Black and power supply is given. The connection setup is shown in Fig.4.

Fig.4. BeagleBone Black with Webcam

4.2 CLIENT AUTHENTICATION

In this project authentication is created for three clients. The results are shown in Fig.5, Fig.6 and Fig.7.

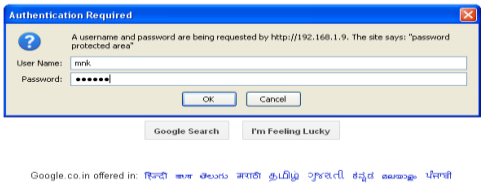

Fig.5. Client Authentication 1

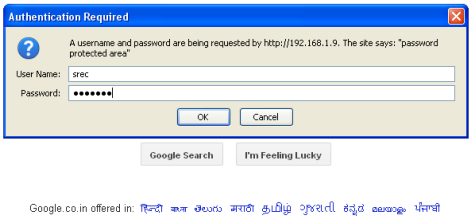

Fig.6. Client Authentication 2

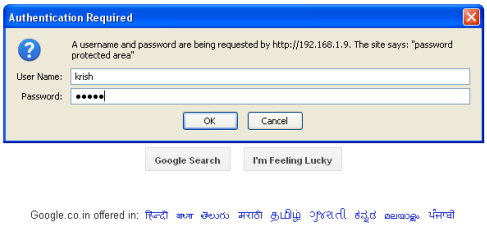

Fig.7. Client Authentication 3

4.3 HOME WEB PAGE

It gives the information about videos; upload, settings and other details are shown in Fig.8.

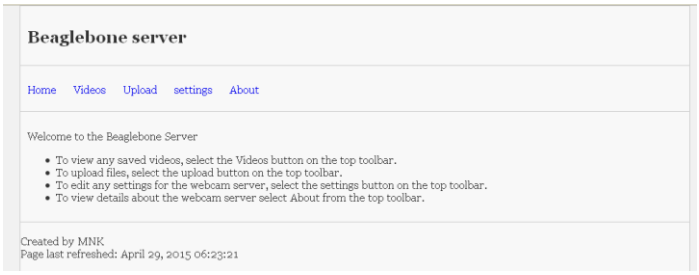

Fig.8. Home Web page

The saved videos can be downloaded using video web page are shown in Fig.9 and Fig.10

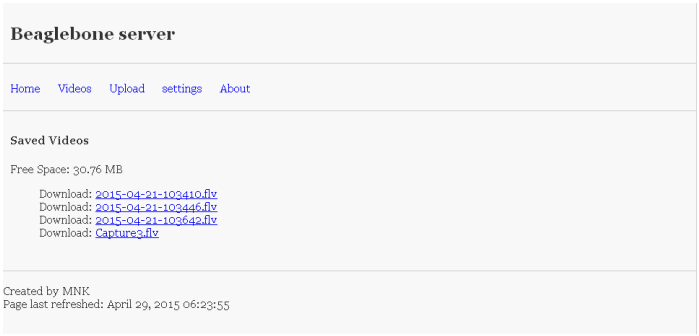

Fig.9. Video Web page

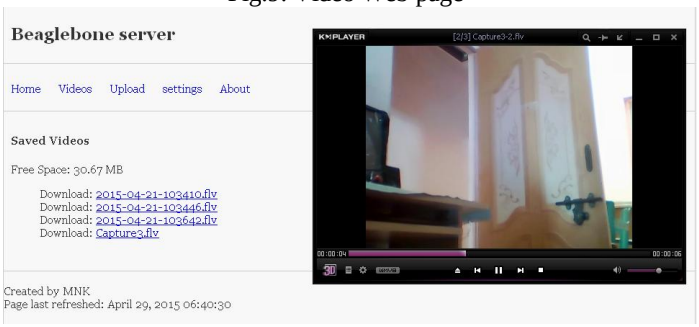

Fig.10. Client Viewing Saved Videos and Can Download

The client can upload the files using upload web page are shown in Fig.11 and Fig.12.

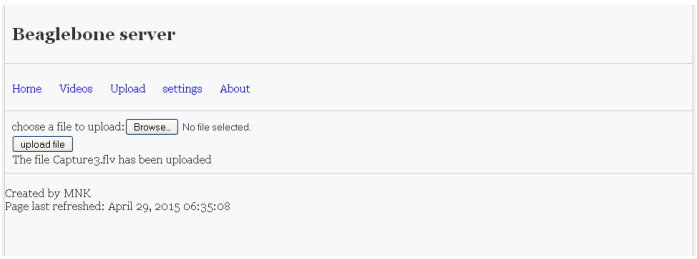

Fig.11. Upload Web page Client Can Upload Files to Server

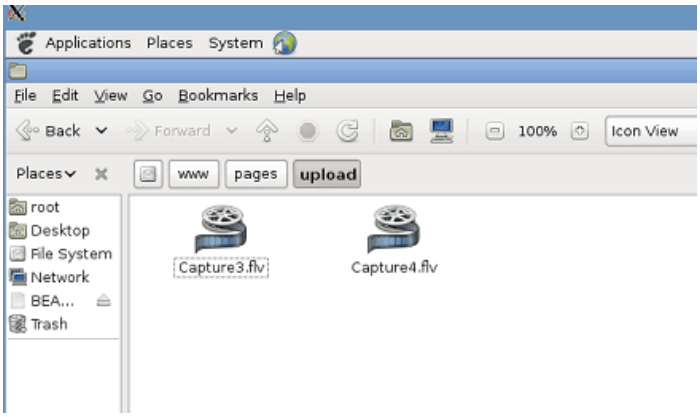

Fig.12. Uploaded Files in Server

The settings web page can be used by the client to change the settings such as password, date etc are shown in Fig.13.

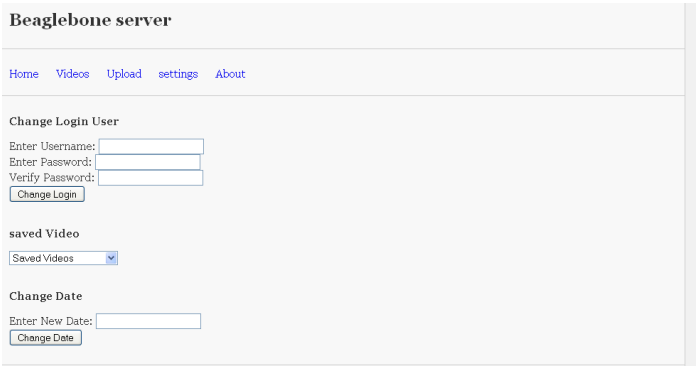

Fig.13. Settings Web page

The web pages descriptions are available in about page are shown in Fig.14.

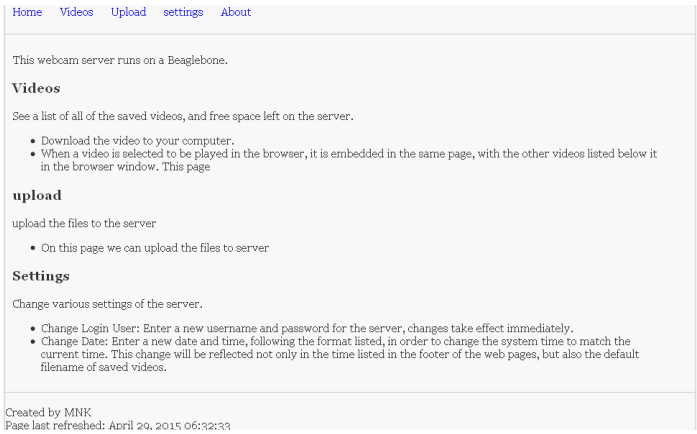

Fig.14. about Web page

The BeagleBone Black can be remotely accessed using the MobaXterm which is virtual remote software for windows. The MobaXterm is shown in the Fig.15.

Fig.15. MobaXterm

5 CONCLUSION AND FUTURE WORK

In this project the video streaming using BeagleBone Black is implemented and video is saved in the server and the client can download the video using proper authentication. Also the client can upload the files to the server and settings can be changed if needed. The prototype model of Beagle Bone Webcam Server can be used as a standalone access point, selectively to save videos to the system server for security application.

The system can be extended by interfacing wireless technologies like Bluetooth, WI-FI, GSM, GPRS etc. The applications include Web browsers used for the TV and Security camera analyzer, streamer, recorder, and monitor.

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[6] http://beagle.org

[7] http://ffmpeg.org/ffmpeg.html

[8] http://flowplayer.org/