WIRELESS VIDEO SURVEILLANCE USING ARM11 PROCESSOR

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ABSTRACT:

Projects tends to be short-term and Products tends to be ongoing endeavors. Similarly our sole intention was to create a product rather than a prototype project. We didn't like our faculty to surveillance physically the college gate. At very onset, we wanted to do something innovative, something that can be used by common people in our society. This resulted us in the creation of Wireless Video Surveillance. The existing disadvantages in Video Surveillance System made us think for a change. Based on that, we created a Wireless Video Surveillance System, which is much more economical, easy to implement and hustle free. The entire system is done with minimum power consumption. This product by us can be used by anyone with minimum knowledge. Its implementation can be found in any educational institutions, hospitals, offices, banks etc. It can be also used as Infant Monitoring System in homes as well as Patient Monitoring System in Hospitals. With more investments we can deploy this surveillance, covering an area of 10km.

INTRODUCTION:

The **Raspberry Pi** is a series of credit card-sized single-board computers developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

The original Raspberry Pi and Raspberry Pi 2 are manufactured in several board configurations through licensed manufacturing agreements with Newark element14(Premier Farnell), RS Components and Egoman. These companies sell the Raspberry Pi online. Egoman produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

The original Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-700 MHz processor, Video CoreIV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (models B and B+) to 512 MB. The system has Secure Digital (SD) (models A and B) or MicroSD (models A+ and B+) sockets for boot media and persistent storage.

In 2014, the Raspberry Pi Foundation launched the Compute Module, which packages a BCM2835 with 512 MB RAM and an eMMC flash chip into a module for use as a part of embedded systems.

The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Pythonas the main programming language, with support for BBC BASIC (via the RISC OS image or the Brandy Basic clone for Linux), C, C++, Java, Perland Ruby.

fig 1: raspberry model

As of 18 February 2015, over five million Raspberry Pis have been sold. While already the fastest selling British personal computer, it has also shipped the second largest number of units behind the Amstrad PCW, the "Personal Computer Word-processor", which sold eight million.

In early February 2015, the next-generation Raspberry Pi, Raspberry Pi 2, was officially announced. The new computer board will initially be available only in one configuration (model B) and features a Broadcom BCM2836 SoC, with a quad-coreARM Cortex-A7 CPU and a VideoCore IV dual-core GPU; 1 GB of RAM with remaining specifications being similar to those of the previous generation model B+. Crucially, the Raspberry Pi 2 will retain the same US$35 price point of the model B,with the US$25 model A remaining on sale.

ARM 11

The **ARM11** is a group of 32-bit RISC ARM processor cores licensed by ARM Holdings**.**

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings.

A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical CISC x86 processors in most personal computers. This approach reduces costs, heat and power use. Such reductions are desirable traits for light, portable, battery-powered devices including smart phones, laptops, tablet and notepad computers, and other embedded systems. A simpler design facilitates more efficient multi-core CPUs and higher core counts at lower cost, providing improved energy efficiency for servers.

The ARM11 micro architecture (announced 29 April 2002) introduced the ARMv6 architectural additions which had been announced in October 2001. These include SIMD media instructions, multiprocessor support and a new cache architecture. The implementation included a significantly improved instruction processing pipeline, compared to previous ARM9 or ARM10families, and is used in smartphones from Apple, Nokia, and others. The initial ARM11 core (ARM1136) was released to licensees in October 2002.
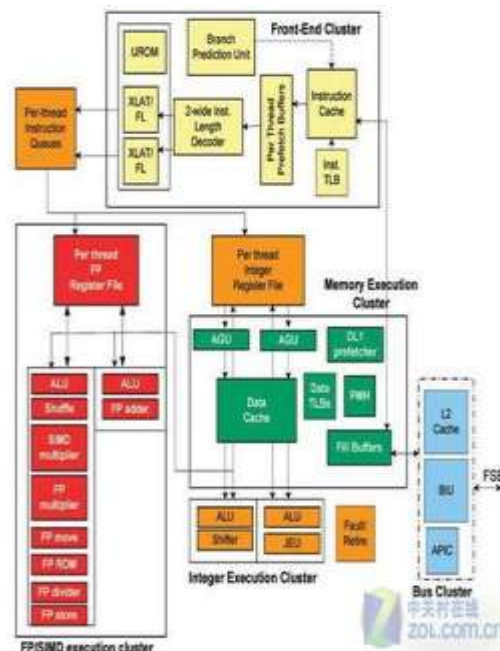
fig 2: ARM 11 architecture

The ARM11 family are currently the only ARMv6-architecture cores. There are however ARMv6-M cores (Cortex-M0 and Cortex-M1), addressing microcontroller applications. ARM11 cores target more demanding applications.

In terms of instruction set, the ARM11 builds on the preceding ARM9 generation. It incorporates all ARM926EJ-S features and adds the ARMv6 instructions for media support (SIMD) and accelerating IRQ response.

Micro architecture improvements in ARM11 cores include:

- SIMD instructions which can double MPEG-4 and audio digital signal processing algorithm speed

- Cache is physically addressed, solving many cache aliasing problems and reducing context switch overhead.

- Unaligned and mixed-endian data access is supported.

- Reduced heat production and lower overheating risk

- Redesigned pipeline, supporting faster clock speeds (target up to 1 GHz)

    - Longer: 8 (vs 5) stages

    - Out-of-order completion for some operations (e.g. stores)

    - Dynamic branch prediction/folding (like XScale)

    - Cache misses don't block execution of non-dependent instructions.

- Load/store parallelism

- ALU parallelism

- 64-bit data paths

JTAG debug support (for halting, stepping, breakpoints, and watchpoints) was simplified. The EmbeddedICE module was replaced with an interface which became part of the ARMv7 architecture. The hardware tracing modules (ETM and ETB) are compatible, but updated, versions of those used in the ARM9. In particular, trace semantics were updated to address parallel instruction execution and data transfers.

ARM makes an effort to promote good Verilog coding styles and techniques. This ensures semantically rigorous designs, preserving identical semantics throughout the chip design flow, which included extensive use of formal verification techniques. Without such attention, integrating an ARM11 with third party designs could risk exposing hard-to-find latent bugs. Due to ARM cores being integrated into many different designs, using a variety of logic synthesis tools and chip manufacturing processes, the impact of its register-transfer level(RTL) quality is magnified many times. The ARM11 generation focused more on synthesis than previous generations, making such concerns be more of an issue.

PROPOSED WORK:

The existing video surveillance system involves high end cameras, video servers, network switch and monitoring PC. All these resources lead to complexity, high power consumption and also require more area. In order to overcome these drawbacks in the existing system, this project presents a proficient way in implementation of Wireless video Surveillance.

Description: The video captured by the camera is compressed by the Raspberry-PI and then transferred with the help of WI-FI router. The Data transmitted by the WI-FI router can be accessed by any smartphone, laptop and tablet.

APPARATUS:

- ➢ Raspberry – Pi
- ➢ WI-FI Router
- ➢ Smart Phone
- ➢ USB Camera

BLOCK DIAGRAM :
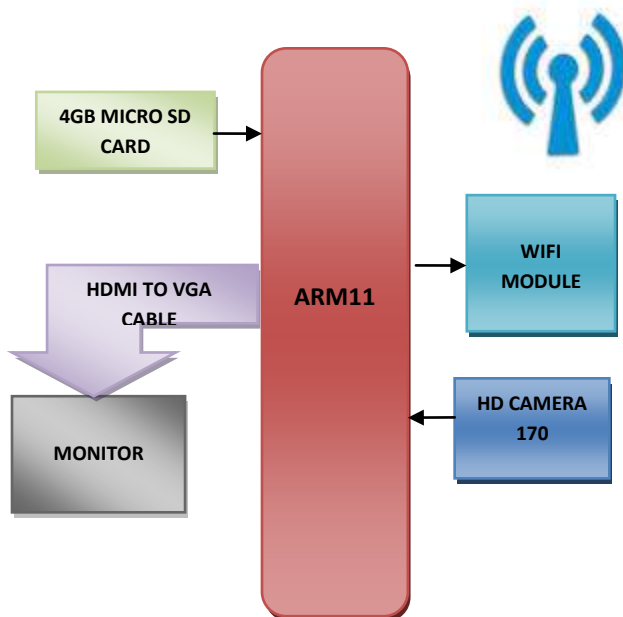
The simple working structure of the system

Working: The which adopts Raspberry PI as controller is the core of the whole system.

- Initially, from the USB camera, the video data is collected by the embedded Linux system.

- It is then processed, compressed and transferred by the processing chip.

- Then, the video data is sent to the monitor client by wireless network.

- The total application depends on Raspberry PI because it is a credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing.

- The video data which is captured from the USB camera, is compressed into JPEG format, and then it is transferred from the WIFI network under the control of the ARM11 chip.

- Then, the monitor client will receive the compressed data frame.

- With the help of IP address we are able to see the live video from anywhere.

ADVANTAGES :

- Simple and easy system to construct
- By substituting WI-FI router of high capacity we can even stream video from long distance up to 2 kilometres
- Most economical way of video surveillance
- Secured way of monitoring.

CONCLUSION:

Our sole intention while developing this project was not to create a prototype project. Instead our intention was to create a **"FULL SCALE PRODUCT"** which can be used by every common people. The proposed product aims to efficient video surveillance for domestic purpose. This is an excellent application for replacement of existing wired system. The product is created in such a way that anyone who has a basic experience of using an electronic device will

be able to use it easily without any complications. It does cover all limitations of existing system such as

- ➢ High Power Consumption
- ➢ Highly Expensive
- ➢ Requires More Area
- ➢ Complex Circuitry.

REFERENCES:

1. *D-Link India Limited. "DI-SR RUTERS" . Copyright © 2018 D-Link India Limited available at online source: http://www.dlink.co.in/products/?pid=593*

2. *Linux programming tools Unveiled"- N. B. Venkateswarlu, BS Publications*

3. *The Evolution of Video Streaming and digital content delivery Darrell M. West Centre for Technology Innovation at BROOKINGS*

4. *A cost effective Multicast video streaming by real time protocol using Sitara AM335x, P. Saravana, GTJEC, Vellore International Journal of Engg. Sci.and innovative Technology(IJESIT) Vol. 3, issue3,May 2014*

5. *RASPBERRY PI FOUNDAION. "Raspberry Pi Desktop (for PC and Mac) ". available at online source: https://www.raspberrypi.org/downloads/*

6. *ZEBRONICS: "Web cameras" available at online source: http://zebronics.com/product-category/webcameras*

7. *http://en.wikipedia.org/wiki/Memory_card*

8. *http://www.element14.com/community/community/raspberry-pi*

9. *https://www.raspberrypi.org/documentation/installation/sd-cards.md*