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Department of Electronics – Wayamba University of Sri Lanka

USB SWITCHER FOR CCTV SYSTEM

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ABSTRACT

The aim of this project is to design and construct a low cost USB Switcher for CCTV System. USB Switcher is a device which has the ability to do the DVRs (Digital Video Recorder) operations using a single mouse. That means the some kind of multiplexing function is done by the USB Switcher. This USB Switcher circuit consists of a PIC18F2550, LM2596 power unit, ULN2003, USB ports and relays. The PIC Microcontroller is programmed in Constant 5V is provide by the Power unit. This PIC program is basically built by considering USB ports and Relays. By using this device we can perform the task using one mouse instead of several mouse(s).

Keywords: Closed Circuit Television, Microcontroller, Digital Video Recorder, USB Switcher

1. INTRODUCTION

USB Switcher is mainly connected with the DVR (Digital Video Recorder) in a CCTV system. Although there are commercially available USB Switchers, they are very expensive. In this study it was attempted to develop a USB Switcher with very simple logic, which is user friendly and low cost. When consider about the cameras connected to several DVRs the USB Switcher is very useful for that system. The device works under the basic functions as shown in figure 1.

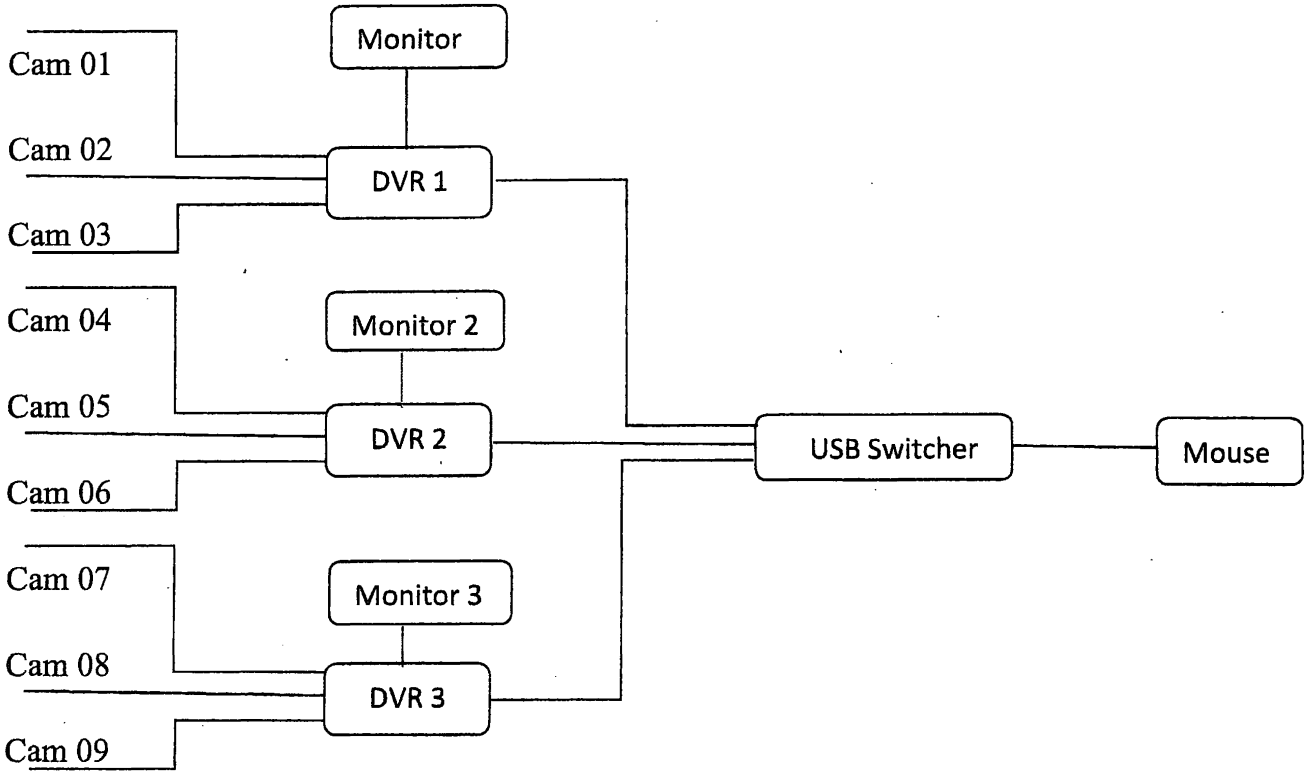

Figure 1: Block diagram of the CCTV system

Cameras were connected to the Digital Video Recorder (DVR) which was directly connected to the monitor. Each DVR having a mouse to control the system. That mouse ports were connected to the USB Switcher. So it could be control the whole system by one mouse which was connected to the USB Switcher. Also there are push buttons to activate the corresponding monitor. Monitor should be selected manually using push buttons. After it can be used USB switcher mouse for selected Digital Video Recorder's functions.

2. EXPERIMENTAL

For the designing of the USB switcher for the CCTV system, a microcontroller was used. This microcontroller is connected to the ULN2003 which is a motor driver IC, Relays and LM2596 power unit. The details of the components are as follows.

2.1 Circuit Components

PIC18F2550 Microcontroller

This family of devices offers the advantages of all PIC 18 mc namely, high computational performance at an economical price-with the addition of high endurance, Enhanced flash program memory. In addition to these features, the PIC18F2455/2550/4455/4550 family introduces design enhancements that make these microcontrollers a logical choice for many high-performances, power sensitive applications. Microcontroller is used to determine doing the multiplexing part in USB switcher. [2]

ULN2003 (Relay driver)

The ULN2003 is high voltage, high current Darlington arrays each containing seven open collector Darlington pairs with common emitters. Each rated at 500mA and can withstand peak currents of 600mA. Suppression diodes are included for inductive load driving and the inputs are pinned opposite the outputs to simplify board layout. [1]

2.2 Design of the circuits

At the beginning the program was implemented and the circuit was designed using the Proteus software and the PCB design was taken from the ARES. Finally the circuit board was designed and the components were soldered to the circuit board.

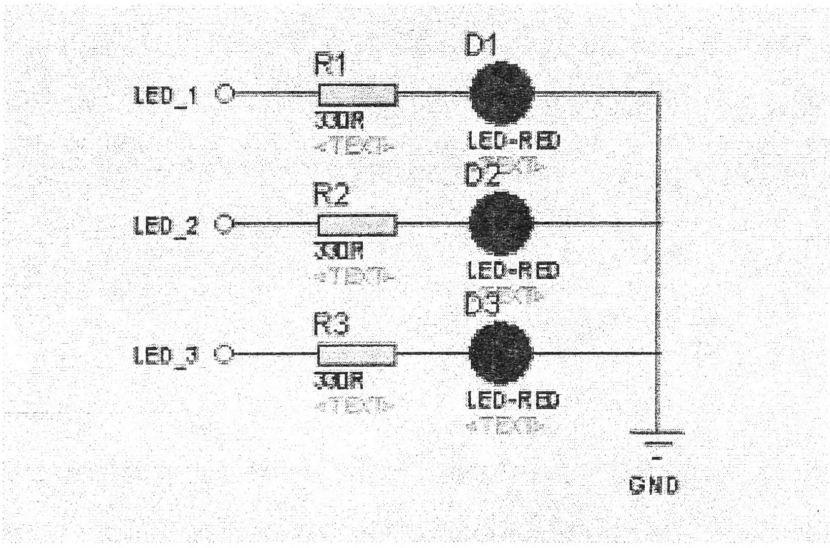

Figure 2: Indicator circuit part within the USB switcher

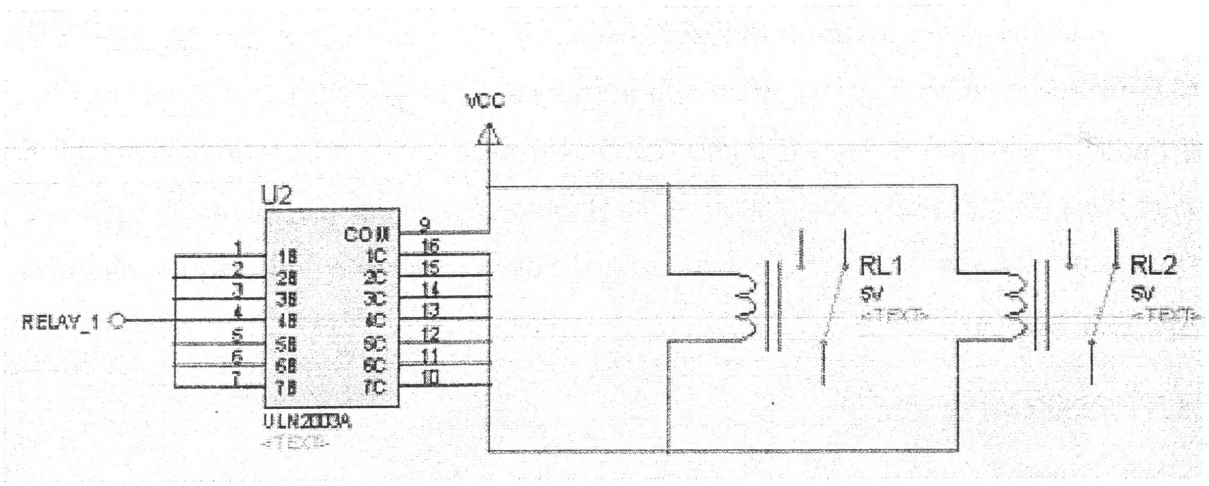

Figure 3: ULN 2003 Relay drive circuit

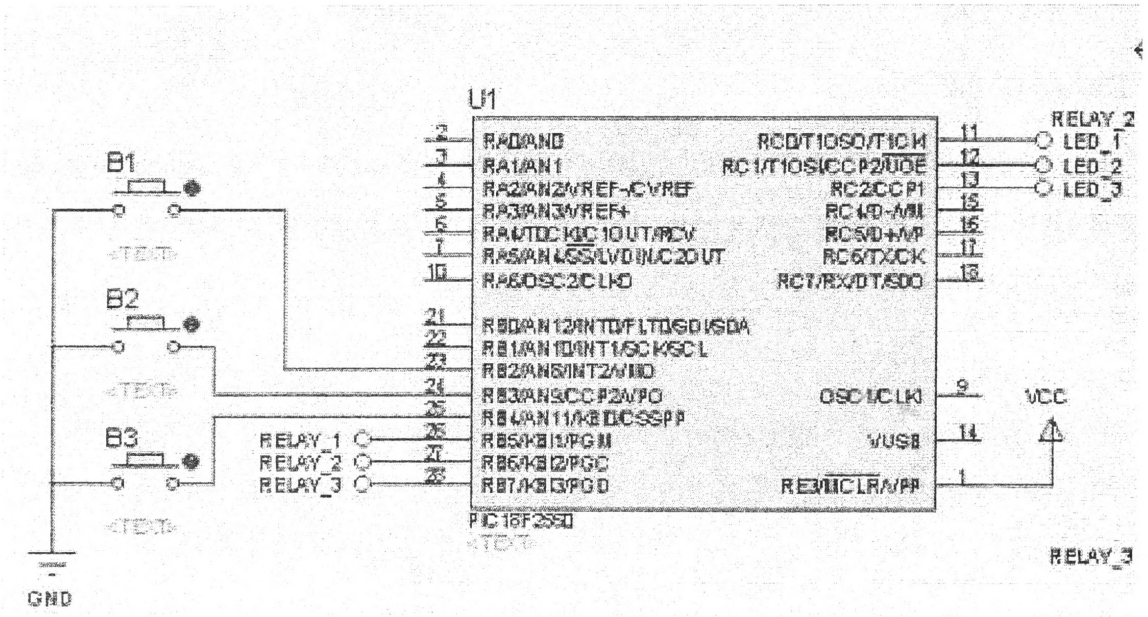

Figure 4 Data processing unit

Three input buttons were connected to the Microcontroller. There are three LEDs which are connected through the output pins of the microcontroller. The LEDs are used use to indicate the active channel. Also there were ULN2003 IC used to drive the three relays.

3. RESULTS AND DISCUSSION

This USB Switcher consists of a very simple circuit design. By using this we can handle a large number of DVRs using a single mouse. This can be used for the large CCTV projects. USB

Switcher connected to the Digital video Recorder using female USB ports. Only one port is activated at a time. Using a single mouse we can do the process of the CCTV system having a large no of cameras. This device has several advantages they are,

- Low price
- Easy to use
- Lower initial cost
- Minimum video losses

Although USB switcher available in the market highly expensive than this one. Because of that it can be implemented for large CCTV projects.

4. CONCLUSION

The purpose of this project was to design a simple, low cost but reliable USB Switcher for CCTV systems. It is easy to handle the entire system. Also with the designed switcher it can use for the other similar systems not only CCTV system. This was practically used in CCTV systems at Wattala Toyota Company.

ACKNOWLEDGEMENT

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REFERENCES

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[2]. http://ww1.microchip.com/downloads/en/devicedoc/39632c.pdf

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